THE GAS JOURNAL

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A Glance at the Contents—

Prohibition of Gas.

A question was asked in the House of Commons by Mr. Hutchison regarding the ban on gas on certain housing estates in Essex. The Minister of Health said he deprecated arbitrary action of this kind. [p. 581.]

Assistant Sales Superintendent Wanted.

It will be seen from our advertisement columns that the Directors of the Southampton Gaslight and Coke Company are inviting applications for this post. The commencing salary is £350 per annum. [p. 588.]

Opening of New Meter Works.

There was an interesting event in Bristol last Thursday, when Mr. G. H. Boucher, Chairman of the Bristol Gas Company, officially opened the new branch factory of Messrs. Thomas Glover & Co., Ltd., and R. & A. Main, Ltd. [p. 565.]

Moving Gas Signs.

In our columns to-day a very interesting apparatus is described in the new automatic moving gas sign, recently produced by Messrs. Falk, Stadelmann, & Co., Ltd. [p. 572.]

New " W.-D." Plant at Shrewsbury.

A new installation of a bench of twelve latest upwardly-heated Woodall-Duckham continuous vertical retorts capable of carbonizing 80·4 tons of coal and of producing 1,460,000 c.ft. of gas a day was formally inaugurated at Shrewsbury on June 2. [p. 567.]

South Suburban Gas Bill.

We conclude this week our report of the hearing of the South Suburban Gas Bill, which came up for consideration by the House of Commons Select Committee on May 25. The Committee announced finally that the promoters had proved their case with regard to the differentiation of charge. [p. 577.]

The Self-Adjusting Pipe Joint.

In our issue to-day Mr. F. W. O. White, of the Stanton Ironworks Company, Ltd., describes a departure from established practice in the production of self-adjusting pipe joints, which provide a main that is durable and capable of withstanding the effects of vibration and subsidence. [p. 575.]

Forthcoming Engagements

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

June 14.—INSTITUTION OF GAS ENGINEERS.—Meeting of Joint Lighting Committee, 2.15 p.m., 28, Grosvenor Gardens, S.W. 1.

June 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board, 28, Grosvenor Gardens, S.W. 1.

June 18.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION (AUXILIARY SECTION).—Meeting at the works of the Washington Chemical Company, Ltd.

June 22.—S.B.G.I.—Council Meeting at 12 noon.

June 22.—INSTITUTION OF GAS ENGINEERS.—Meeting of Joint Lighting Committee, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

June 23.—B.C.G.A.—Meeting of General Committee, 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

June 24.—B.C.G.A.—South-Western District Conference, Dartmouth.

June 24.—WAVERLEY ASSOCIATION.—Annual Meeting in Edinburgh. Address by the President, Mr. James Bell.

June 29.—B.C.G.A.—Lancashire District Conference, Stockport.

July 1.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Summer Meeting at Ramsgate.

Aug. 16 and 17.—IRISH ASSOCIATION.—Meeting in Dublin.

Sept. 1.—ASSOCIATION OF STATUTORY METER INSPECTORS.—Annual Meeting in Edinburgh.

Sept. 8.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Ayr.

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Page 10.—BRAINTREE. W. Surman, deceased.
Page 16.—CHELTENHAM. C. W. Welford, deceased.

EDITORIAL NOTES

Hopes Justified

IN regard to the Institution of Gas Engineers, each year records fall; and this year is no exception. The annual meeting may be looked upon as a sort of stock-taking of progress made; and the present stock-taking shows only encouraging results. As all our readers know, while this "JOURNAL" goes to press the eagerly anticipated June meeting is in full swing, and we may say that it is enjoying a splendid success. Already the first day's session at the Park Lane Hotel, London, is over, and the President, Mr. J. H. Canning, has addressed an assembly as surely imbued as ever with enthusiasm and rightly holding high hopes for the future of the Gas Industry. In a time of unparalleled international and national industrial and economic troubles, our Industry at least has proved a sheet anchor of the greatest stability. During the last twelve months (we quote Mr. Canning) "the financial security of many other countries has trembled in the balance, great financial interests have foundered in the storm, and far too many of our staple industries have, wholly or partially, lost their profit-earning capacity." Yet the Gas Industry "has not only survived this unexampled economic tempest and trade depression, but has fully upheld its position, and, even at a moment when Government securities were severely affected by world-wide uncertainty and apprehension, the stocks and shares of gas companies maintained their value in a manner unsurpassed by the securities of any other trade or industry."

This quotation gives some idea of the dignified charm which characterizes the Presidential Address of Mr. Canning, and which was listened to with such obviously keen and appreciative interest. Next week we shall present our readers with a full account of the proceedings at the Institution Meeting—proceedings which have been so excellently planned to satisfy the needs of all members of our Industry and to assist those in charge of undertakings both large and small. The statesmanlike speech of the President, however, calls for immediate reference. We regard as a happy augury for the future the increasing co-operation between the Gas Industry of Great Britain and that of Continental countries and of America—a new era which was heralded at the International Gas Conference last June. Since then Mr. Canning has visited, in the capacity of President of the Institution, both Canada and the United States; and his impressions of the spirit of international friendship and of the benefits of wider technical discussion are recorded in his Address, in which he quite naturally remarks on the progress of gas in the two "electrical" countries he visited. There is every reason for satisfaction in his remarks. In Toronto, for example, which is supplied with electrical energy generated at Niagara, the rates for electricity for household use are probably lower than in any other comparable community elsewhere. Notwithstanding this, the Consumers Gas Company of Toronto has a remarkable record of continuous progress and prosperity. In the last ten years the total sales of gas have increased by more than one-third. And a similar story is to be told of the progress of manufactured gas in the United States of America. These results have been achieved by engineering skill, business acumen, and vigour and enthusiasm; but there can be little doubt that the absence of antiquated legislation has helped enormously in this development; and Mr. Canning looks forward to the freeing of the Gas Industry of our own country from legislation and municipal obstruction which weigh so heavily and so unfairly against the Industry.

On the work of the Institution of Gas Engineers, Mr. Canning refers particularly to the increasing value of the research work annually carried out in co-operation with the University of Leeds, to the welcome development of the co-operation of the Institution with the research departments of the larger gas undertakings and of private laboratories, and to educational work. The labours of the Education Committee are bearing fruit, as is demonstrated by the fact that the number of entrants for the Examinations of the Institution this year showed an increase of over 56 p.ct. as compared with last year. "It may now be confidently stated," observes Mr. Canning, "that, on the lines laid down, an intelligent and industrious aspirant will attain a standard both of general and specialized education which will admirably fit him for the tasks which await him in the future. It is vital, however, that the right type of candidate should present himself, and the responsibility for securing this, which does not rest with the Institution, is a very real and serious one, as our future success depends upon the maintenance of the proper standard." If the prospective rewards of a Gas Engineering career are sufficient, the right type of candidate will not be lacking. In the case of most undertakings this is fully realized and acted upon, but we are in complete agreement with the President that, until such action becomes universal, the full possibilities of the Industry will not be developed.

Iron and Steel Industries

THE opinion has often been expressed that the re-building of the nation's prosperity would have to be on the foundations of the iron and steel industries. For this reason, no one can regard lightly the announcement that the Import Duties Advisory Committee have appointed a National Committee to work out, with District Sub-Committees and a small Executive Committee, appropriate schemes for the re-organization of these industries. The names that are mentioned in connection with this National Committee will inspire general confidence. The Chairman is to be Mr. Charles Mitchell (who is Chairman and Managing Director of Messrs. Dorman, Long, & Co.), while the duties of Secretary will be undertaken by Sir William Larke (Director of the National Federation of Iron and Steel Makers).

A few days ago the Advisory Committee met a large number of representative iron and steel producers, and on that occasion the Chairman of the Committee, Sir, George May, made a statement explaining the position as it exists at the moment. The main value of a tariff, he said, "will be to afford the industry the opportunity of putting itself in order on the lines best adapted to this country and the diversified nature of the demands which have to be met; the methods of organization adopted in other countries are not necessarily appropriate in our own case. A determined and united effort, in which personal considerations will have to be put aside, is essential. The work of re-organization cannot be completed at a stroke; it will be a process of evolution; but the Committee are convinced that the main lines of this evolution must be laid down and the all-important first steps must be taken concurrently with the granting of adequate protection in the home market. They must, in fact, be a condition of such protection. The Committee have no desire to dictate to the industry what the general

lines of evolution should be; the industry itself must work out its own plans. But the Committee will not hesitate to criticize those plans in respect of their adequacy to meet the emergency with which the country's trade is faced. The Committee have therefore decided to constitute a National Committee to work out appropriate schemes."

Referring more directly to the question of protection, Sir George May pointed to the temporary arrangement by which the total duty has been raised to 33⅓ p.ct. on certain classes of heavy iron and steel products, and said the Committee wished now to make it quite clear that, should the present abnormal competition continue, " they would not hesitate to recommend a continuance of the existing emergency duties for as long as may prove to be necessary, and the industry can be assured that, provided they do their part, the permanent tariff to be recommended will be sufficient to achieve the object in view." This allusion to a " permanent tariff sufficient to achieve the object in view " will be noted with satisfaction by the iron and steel industries. Some such assurance they have a right to expect—and, indeed, reasonable promise of continuity of the new policy of protective tariffs is essential to any industry if it is to make the best use of the opportunities which the changed conditions present.

Gas-Works for Sale?

We have on several occasions recently drawn attention to the excellent reputation which the Gas Industry enjoys in the minds of investors, as evidenced by the steadiness of gas stocks throughout a period of unparalleled industrial depression. The promise which the Industry holds out of development at an even more rapid rate than in the past, as soon as the country's position is really on the mend, makes a shareholding in a gas company particularly attractive. This is our opinion, and our postbag proves that it is the opinion of others also. Inquiries as to whether present owners of gas undertakings would be willing to sell—and we understand that such inquiries are being made—are complimentary, assuming them to represent a desire to secure a " good thing " at a fair price, and subject to every reasonable safeguard in respect to both consumers and shareholders. Such safeguards would naturally be insisted upon as the very basis of any negotiations that might take place.

We have spoken here of " companies," but the position of municipally-owned undertakings is, of course, equally sound, and the outlook as promising. This is apparently recognized by those making the inquiries; for at least one case has come to our knowledge of an important corporation being asked whether they are prepared to consider the question of the sale of their gas undertaking.

Rating and Valuation

A somewhat novel point of interest to all gas undertakings—notwithstanding that the case was heard under the provisions of an Irish Act—was raised during the course of the successful appeal of the Cork Gas Consumers' Company from the assessment of the Commissioner of Valuation. After hearing evidence on both sides, Mr. Justice Kenny found in favour of the Company and reduced the rateable value from £8000 to £5000, which, seeing that the Cork City rates are 18s. in the £, has well justified the trouble and expense to which the Company was put as a result of a suggestion by Mr. H. Lisney, a Fellow of the Surveyors' Institution, who gave evidence in support of the Commissioner's valuation.

The valuer for the Company (Mr. J. H. Allen), in submitting an assessment of £2834, stated that he had followed the lines adopted by the Commissioner of Valuation himself, and from a report of the proceedings it would appear that, apart from minor disagreements as to the computation of the various items, such as the proportion of working expenses, stock of coal, value of public lamps and of meters and cookers kept in reserve, to be included in " Tenant's capital," and the inclusion of directors' and auditors' fees in the Company's expenditure, the main difference arose from the suggestion that the credit to be obtained from an undertaking of the standing of the Cork Gas Company should be taken into account in the valuation.

Evidence was given to the effect that at various dates from 1928 to 1931 the Company's accounts showed sundry credit balances to the extent of some £28,551 to £43,558, and the Commissioner's Valuer took this latter figure as indicative of the fact that, in arriving at the amount of working capital the hypothetical tenant would have to provide when taking possession of this undertaking, no such provision would be necessary. He argued that, as the accounts showed that credit to the extent of £43,558 could be obtained, the tenant would need no working capital at the outset, and further implied that in his submission he relied on the financial standing of the Company and did not need to inquire into the nature of the £43,000 credit.

From time to time, in the " Journal," we have commented on strange proposals for the valuation of gas and other public utility hereditaments, but the Cork case seems to us unique; and it is gratifying to note that his Lordship, in reducing by £3000 the assessment appealed against, stated that he was satisfied the proposed assessment of the Commissioner of Valuation would be far greater than the undertaking could sustain and would be oppressive in view of previous assessments and the tendency for a decrease in the gross receipts. We have already indicated that this case was brought under the provisions of the Irish Valuation Act of 1852, which are inapplicable to this country, and it may be for the reason that under this Act the entire onus of proof is put on the person who seeks to displace the Commissioner's valuation, that the Judge did not see fit specifically to reject this far-reaching suggestion. However, the Gas Industry is indebted to the Cork Gas Company for rebutting in a measure the contention advanced on behalf of the Respondent Commissioner.

PERSONAL

Thought to be Scotland's oldest works manager, Mr. John Webster, Manager of Provan Gas-Works, Glasgow, has retired after fifty years' service in the Gas Industry. To mark his retirement, members of the Corporation staff and senior officials met him at the works and presented him with a cheque. Mr. Fraser, Manager of the Dalmarnock Works of the Corporation, made the presentation and paid a tribute to Mr. Webster's abilities as a gas engineer, as also did Mr. J. W. McLusky, Engineer and General Manager. Mr. Webster was trained at Durie Foundry, Leven, and was responsible for the construction of gas plant for all parts of the world. When Provan Gas-Works, then one of the largest in the country, was opened in 1904, Mr. Webster was appointed Manager and in all has 36 years' service with Glasgow Corporation to his credit.

We announced last week that Mr. R. H. Saunders, of Slough, had been appointed Assistant Engineer and Secretary to the Newmarket Gas Company. He has, however, resigned this position in order to go into business with his father.

Mr. E. J. Fox, the Managing Director of the Stanton Ironworks Company, Ltd., near Nottingham, has been elected Chairman of the Council of the Society of British Gas Industries for the coming year.

A week or so ago, Mrs. Smith, of West Road, Air, widow of the late Mr. William Smith, who was for many years Gas Engineer at Bolton, celebrated her centenary. She is still enjoying good health.

Miss Edith Greaves, daughter of the late Mr. Greaves, of Roslyn, Blackpool, and Mr. J. H. Race, elder son of Mr. William Race, Manchester Road, Burnley, were married at St. John's Church, Blackpool, on June 2. Mr. J. H. Race is the Engineer and Manager to the Farnworth and Kearsley Gas Company.

OBITUARY

General sympathy will be extended to Mr. Alfred Canning Williams, formerly Treasurer and Collector for the Edinburgh and Leith Gas Commissioners, whose wife was accidentally killed by the explosion of a Mills bomb which was assumed to be " dead." The accident occurred at his residence, Parkanaur Avenue, Thorpe Bay.

THE NEWS OF THE WEEK

The Worst Floods since 1900 were experienced recently in the Coleshill district of Birmingham, many roads being impassable. The works of the Coleshill Gas Company were surrounded, and pumps had to be kept going as a precautionary measure.

Very Keen Competition was shown when four thousand additional 7 p.ct. shares in the Newquay (Cornwall) Gas Company were offered for sale by public auction on Friday, May 27, and the whole of the lots were quickly sold at prices ranging between 21s. 3d. and 22s. 3d. per share.

The Accounts of the Plymouth Gas Undertaking for the past year show that the revenue amounted to £173,311, and that after providing for interest and sinking fund charges there is a net loss of £4065, which has been added to the deficit of £2549 at the beginning of the year and carried forward.

Co-Partners of the Hastings and St. Leonards Gas Company, numbering 189, visited the Royal Tournament at Olympia on Saturday, May 28, as part of the arrangements made by the Company to celebrate its centenary. A second party of 160 travelled to Olympia last Saturday, again under the direction of Mr. C. F. Botley, the Engineer and General Manager, who has been responsible for the arrangements throughout.

A Strange Accident occurred at the Birnam (Perthshire) Gas-Works recently which temporarily deprived the village of gas. The gasholder, which has a capacity of approximately 5000 c.ft., tilted over to an angle of 45° while the Manager, Mr. James M'Donald, was engaged in painting it. All the gas escaped, but Mr. M'Donald was none the worse for his adventure. The accident occurred in the afternoon, and by 10.30 the same night the holder had been righted.

Five Employees who have just retired from the service of Halifax Corporation Gas Department have a record of service amounting in all to 225 years. They are Messrs. George Holmes, mains and service foreman (45 years' service); Walter Howlett (49 years); Tom Penrose (43 years); John Turner (45 years); and Andrew Phillips (43 years). The colleagues of the first three on the mains and services staff have presented each of them with a clock as a mark of goodwill.

The 73rd Annual Meeting of the German Association of Gas and Water Engineers was held in Essen on May 30 when among the papers read was one on "New Methods in Gas Production with Deep Cooling, Tower Purification, and Sulphur Extraction," by Dr. Rettenmaier, of Hamborn; one on "Progress in the Industrial Application of Gas," by Herr Wolff, of Essen; and one on "The Continuous Production of Water Gas by the Pintsch-Hildebrand Method at the Hamburg Gas-Works," by Herr Stief.

Dawlish Gas Company Not Sold.—It was reported at a meeting of the Dawlish Urban District Council on Wednesday, June 1, that the required number of shareholders of the Dawlish Gas Company not having given their consent, the suggested sale of the Undertaking to the Council was for the moment at an end. It was felt that it would be against the best interests of the town for the works to pass to the control of outside people, and it was agreed that in the event of the Undertaking being for sale the Directors be asked to give the Council the first option of purchase.

Gas-Driven Motor Vehicles.—At a recent meeting of the Rotherham Corporation Gas Committee, the Engineer and General Manager (Mr. J. T. Haynes) reported on his visit to Paris in order to obtain details and further information with regard to the operation of buses by means of gas stored in high-pressure cylinders. He stated that from experiments carried out in Paris there appears to be no reason why the use of gas in place of petrol should not meet with success. He further reported that he had placed an order for the necessary compressor driving engine and controller with Messrs. Bellis & Morcom, of Birmingham, at a cost of £452, and with Messrs. Vickers-Armstrongs, Ltd., for steel storage cylinders at a cost of £62 4s. The Engineer and General Manager also reported that in collaboration with the Borough Engineer it is also proposed to convert one of the lorries in the Borough Engineer's Department for experimental purposes.

Very Satisfactory Progress was reported at the annual meeting of shareholders of the Lampeter, Llandyssul, Tregaron Gas Company, at Lampeter. Major Harford, who presided, said that, considering the financial difficulties and existing depression, the report was good. It showed a net profit of £253 18s. 2d. for the year.

The Waverley Association of Gas Managers are holding their Annual Meeting in the Goold Hall, St. Andrew Square, Edinburgh, on Friday, June 24, 1932, when the President, Mr. James Bell, of Dumbarton, will take the chair at 10.30 a.m. prompt and give an address which will be open to discussion. The meeting will adjourn for luncheon at 1.15 p.m. in the North British Station Hotel, Princes Street. The Bowling and Golf Competitions will be on the afternoon of Thursday, June 23; the former starting at 1.45 p.m. and the latter at 1.30 p.m.

The Annual Outing and Visit of the Scottish Junior Gas Association (Eastern District) will take place at Burntisland, on Saturday, June 11. The party will meet at the Town Hall, High Street, Burntisland, at 10.30 a.m., and the ladies will proceed to the putting green and sands, while the members visit the gas-works. By kind invitation of the Town Council, lunch will be served at Rossend Castle at 12.30 p.m. In the afternoon, by the courtesy of the Club, members may play over the Dodhead Golf Course, and two rinks of the Bowling Green have been secured for 2 p.m. The remainder of the party will make an excursion to Inchcolm and Donibristle Grounds, and the party will reassemble at 5 p.m., when tea will be served.

Institution of Gas Engineers.

Members of the Institution are invited to attend the 17th Guthrie Lecture of the Physical Society on "The Concept of Causality in Physics," by Prof. Max Planck, at the Imperial College of Science, South Kensington, S.W. 7, on Friday, June 17, at 5 p.m. Admission is free and without ticket.

Copies of the recently issued British Standard Specification for the Determination of the Fusion Temperature of Coal Ash (No. 453-1932) may be obtained, price 2s. each, from the Institution of Gas Engineers, 28, Grosvenor Gardens, S.W. 1.

Meter Testing Station at Watford.

The Herts County Council have established a gas meter testing station in Watford, adjoining the premises of Sawer & Purves, meter manufacturers, of Lower Derby Road, and operations started on May 30.

Previously, all, or nearly all, of the testing for Hertfordshire has been done at a London County Council station, the fees paid by the local gas companies going to the London County Council, and the work of repairing being carried out by London firms.

With the coming of the station in Watford, the first of its kind in Hertfordshire, it is hoped that a substantial sum, instead of going outside the county, will benefit the county, both as a means of providing work, and as an item of income.

Ministry of Health Inquiry at Sidmouth.

A Ministry of Health Inspector held an Inquiry at Sidmouth on Tuesday, May 31, into the Urban District Council's application for sanction to borrow £2745 for the erection of a gas showroom in High Street.

The Clerk to the Council (Mr. P. H. Michelmore) said that until recently the authority owned both the gas and electricity undertakings, but two years ago the electricity undertaking was sold to the East Devon Electricity Company, a subsidiary of the Whitehall Corporation. The East Devon Company recently erected a showroom, and in order to cope with that competition it was now necessary for the Council to have a showroom for the Gas Undertaking. The proposed site was admirably suited for the purpose, and as two flats were to be erected above the showroom the scheme

was likely to be an economic proposition from a business standpoint.

The Gas Engineer and Manager, Mr. H. Burgess, said that they held gas exhibitions in a public hall occasionally and had proved that by suitable display their sales were greatly enhanced.

There was no opposition to the application, and after the Inquiry closed the inspector visited the sites referred to.

Successful Gas Exhibition at Oswaldtwistle.

The accompanying photograph shows a section of a very successful gas exhibition held, in conjunction with a series of cookery demonstrations by Miss E. K. Eason, of Radiation Ltd., at the Town Hall, Oswaldtwistle, from May 9 to 14.

In spite of the extremely depressed state of trade in this district, and the fact that the exhibition was held just before the Whitsun holidays, a most gratifying interest was shown by the public. A total of nine lectures was given, and approximately 1350 persons attended. Demonstrations of the new "Economic" washing machine were also given by the Economic Gas Boiler Company, and altogether the business done was eminently satisfactory.

Gothic Works, Bristol.

There was an interesting event in Bristol last Thursday, when Mr. G. H. Boucher, Chairman of the Bristol Gas Company, officially opened the new branch factory—Gothic Works, Victoria Terrace, St. Philip's Marsh, Bristol—of Messrs. Thomas Glover & Co., Ltd., and R. & A. Main, Ltd.

Mr. Kenneth Aird (Chairman of Messrs. Glover & Main, Ltd.), in a few introductory remarks, said that many of those present would recollect a similar function seven years ago, when the firm opened their then new premises at Bedminster Bridge. At that time, it was thought that the place would satisfy the requirements of the firm for many years.

"It is a significant and gratifying fact," he said, "that we have heavily outgrown those premises, which were really too big for us seven years ago, inasmuch as it is an indication of the growth of the Gas Industry in Bristol and the West of England. We have, I think, occupied no fewer than seven successive premises in Bristol and district during a period of nearly half a century. The fact that we have decided to make our permanent home in Bristol and to put up our own factory to suit our own requirements speaks well for our happy relations with the Bristol Gas Company. We want to render the best possible service," continued the Chairman, "to the Bristol Gas Company and to the public in the West of England generally."

Mr. Boucher, in formally declaring the new premises open, offered congratulations upon the lay-out of the new works, and the excellent conditions and lighting, and referred to the very pleasant relations between the Bristol Gas Company and Messrs. Glover & Main, Ltd. He hoped their expansion would continue—a hope not entirely unconnected with a hope for increased gas consumption.

Sir Paul A. Makins, Bart. (Vice-Chairman of Messrs. Glover & Main, Ltd.), presented Mr. Boucher with a silver salver, on behalf of the Directors and inscribed with their names, as a memento of the occasion.

Among those present at the proceedings, besides Directors of the Companies concerned and representatives of the Industry, were Alderman A. Dowling, whose firm, Messrs. A. Dowling & Son, built the factory, and a representative of Messrs. E. T. Parker & Co., who conducted the negotiations for the site.

THE LUNCHEON.

Mr. Kenneth Aird again presided at the subsequent luncheon at the Grand Hotel.

Major Alexander L. S. Wood, a Director of Glover & Main, Ltd., toasted "The Gas Industry of the West of England."

Mr. Boucher, replying, said that the Gas Industry in Bristol was very happy and not "unprosperous," and had awakened from the moribund condition which had been stated to characterize it 30 years ago to a state of lively health. He thanked the company's hosts for their enjoyable hospitality, and proposed the health of the Chairman, who briefly responded.

After the luncheon a party of guests made a charabanc tour of some of the points of scenic and architectural interest in the city.

Planning for the Future.

The new situation brought about by the imposition of tariffs encourages and requires undertakings in the steel and complementary trades to plan for the future and to enter into arrangements having for their object the economic development of the industry and the prevention of overlapping and duplication of plant for those markets where the productive capacity is already fully sufficient for the demand.

Messrs. Stewarts & Lloyds, Ltd., and the United Steel Companies, Ltd., are of opinion that such development of the steel industry is in the national interest and believe that the expression of an intention by two or more undertakings to co-operate in a general policy will be helpful in advancing this object.

The two Companies therefore have agreed:

(1) To co-operate in the policy of extensions in steel production and avoidance of uneconomic duplication of plant.
(2) To co-operate in sales policy.
(3) To co-operate in research, technical development, and production methods.

An Interesting Demolition Find.

Workmen engaged on the demolition of the York Street Gas-Works at Leeds, which have been out of use for some years and are now being cleared for housing, unearthed last week an iron cover which, when opened, was found to be over an old and forgotten well. The water was quite clear, and it is believed to have been one of the old Leeds spa wells from which, long ago, water was drawn for hawking round the streets in bucket carts and which had the reputation of being highly desirable for brewing tea and home-made beer. The well was found under the remains of the retort house and had obviously long been forgotten. Records of these old wells have been found in an old safe recovered from the débris of the works.

There are also records of the fact that the works, built by the old Leeds Gas Light Company over a hundred years ago, were partly on the site of a former cemetery, and that the Gas Company had to take over certain cemetery rights and to observe certain obligations in relation to the graves. It is not known how many people were buried on the site or whether the Gas Company had the right to draw burial fees as well as gas charges.

The Swansea Gas Exhibition.

In opening the recent Swansea Gas Exhibition, mentioned in last week's "JOURNAL," Mr. Ernest H. Leeder, Chairman of Swansea Gaslight Company, dealt with the value of gas for cookery purposes.

In the course of his address, he said:

It may be a far cry to the advent of gas cooking in the year 1851, and I have no doubt that the first gas cookers encountered that prejudice usually associated with new departures. But the gas cookers came to stay, and their popularity to-day is clearly shown by the fact that they are installed in no fewer than 7 million of the 10 million homes in this country. This may cause some of you surprise, particularly when it is remembered that many homes are in rural districts, beyond the limits of a gas supply; but it is not difficult to appreciate the truth of the statement when the advantages of the gas cooker are fully recognized. There is, for example, the perfect control of the heat and therefore economy of fuel: there is the saving in the work involved in keeping the fire going and cleaning out the ashes; and there is—and this is particularly important in the hot weather—the cool condition of the kitchen. One

THE NEWS—*continued.*

thing I should like to do and that is to dispel the fallacy held in some quarters that the " fumes " from the stove have an injurious effect on the food. On the contrary, the products of combustion do not affect the food, and in point of fact there is complete absence of dust, smoke, and soot, while the cooking is carried out in the most cleanly manner possible. Striking evidence of this healthy condition is afforded by the action of the Institute of Hygiene in equipping their demonstration kitchen with gas cooking appliances, which are also the first choice for most of the large hospitals, hotels, and restaurants. Our boast " The Nation Cooks by Gas " is therefore no idle boast, but a claim to which our Industry is fully entitled, and of which we are justly proud.

The cookery demonstrations by Miss White, of Radiation Ltd., proved very popular items, and this was peculiarly the case with the " specials " for nurses and professional cooks.

Gas or Electricity?

Hornsey Council's Debate.

A scheme to improve the lighting of the Great North Road, between Woodside Avenue and the Woodman, was approved by the Hornsey Town Council on May 23 after a long discussion, in which the merits of lighting by gas and electricity were debated. Two members opposed the scheme, under which it will be necessary to make a capital expenditure of £3102. Of this amount the Electricity Committee will pay one-third.

The Highways and Lighting Committee reported that they had had the matter under consideration for some time and, after investigating some alternative proposals, they recommended that the road should be lighted by electricity instead of by gas, as at present. It was proposed to provide two 100-watt lamps on a bracket attached to alternate tram poles on each side of the road. The capital expenditure was estimated at £3102, which was equal to an annual charge of £247 for 20 years. The Electricity Supply Committee were prepared to contribute one-third of this amount, and therefore the total annual cost of the proposed improvement was £178 per annum. The two-thirds of the capital outlay amounted to £165, *plus* the maintenance and cost of current, £205, giving a total of £370, and after deducting the present cost of gas lighting (£192) the figure of £178 was reached.

Alderman Double ventured to suggest that the first step the Council should take should be to restore the cuts in the salaries of its officers instead of passing the expenditure of £3000 on lighting. It was not a question of gas *versus* electricity; it was purely a matter of finance and of whether the Council should accept the Committee's recommendation or take an equivalent form of lighting at a cost of £151 per annum. He moved that the recommendation should be referred back for further consideration.

After some discussion, this amendment was defeated.

Fuel for Transport.

[*From " The Times."*]

At the resumed Congress of the Institute of Transport at Buxton on June 2 a paper on " Fuel Research in Relation to Transport " was read by Prof. R. V. Wheeler, the Professor of Fuel Technology in the University of Sheffield. The paper was in the main a rehabilitation of coal as the transport fuel of the immediate future, though full justice was done to the advantage of oil in particular cases. But for the European coastwise trade coal could be bought cheaply, and the shorter voyages do not make storage space a major consideration. For such traffic coal will probably continue to be the principal fuel.

Steady progress was being made in the application of pulverized coal firing (the most efficient method of using coal for power production) to the marine boiler. As to railway propulsion, he thought electric traction would be delayed by the high capital cost involved. Experiments in this country to adapt pulverized fuel firing for locomotives did not appear to have made much progress, but in Germany and the U.S.A. the experimental stage had been passed, and the Stug locomotive had a fuel efficiency of 80 p.ct., using coal or semi-coke in powdered form. He thought the steam locomotive might yet withstand successfully the competition of other forms of traction.

The Gas-Driven Vehicle.

In road transport the petrol engine at present stood supreme, but the Diesel engine had challenged the petrol engine for application to heavy road transport (goods and motor-omnibuses), and its success was sufficient to overcome the greater weight per horse power developed in this class of vehicle. The latest competitor for road transport service, however, was the coal-gas engine, using coal gas at 200 atmospheres pressure (about 3000 lbs. per sq. in.) in steel cylinders of moderate size. Paris experience had induced the Birmingham Corporation Gas Department to experiment with " gas-cars," and tests with passenger vehicles would be made as soon as Home Office sanction was given.

Prof. Wheeler said he was convinced that in this country coal must remain the primary source of heat, light, and power. It was the heavy cost of rail transport of coal that had inevitably extended the use of alternative fuels, and the demand for raw coal had also been reduced by the progressive improvement in the efficiency with which coal was used, but he thought further developments in the use of coal in powdered form would dispose of all suggestions that coal should be superseded. He thought there was a future for low-temperature carbonization of coal.

Gas Exhibition and Cookery Lectures in the Channel Islands.

The Gas Exhibition and Cookery Lectures, organized by the Davis Gas Stove Company, Ltd., and held recently at the North Market Hall, Guernsey, were very much appreciated and drew large audiences (in all 1464 people attended), and there were many expressions of appreciation of the skill of Miss Sanderson, the demonstrator, and of the uniform results obtained from the use of " Regulo " controlled cookers.

At the close of the Exhibition, Mr. R. G. Luxon, the Manager of the Guernsey Gas Light Company, Ltd., in the unavoidable absence of the Chairman, expressed the thanks of the Company to the large number of people who had attended the lectures, and for the sales of apparatus which had resulted. He felt that the audience would wish him to express, on their behalf, thanks to Miss Sanderson, with which he coupled that of his Board of Directors. He asked Miss Sanderson to accept a silver Guernsey milk can suitably inscribed as a lasting token of esteem from the Directors.

The appreciation of the audience was noted in the long continued applause, and Miss Sanderson, in response, expressed her pleasure and thanks for the way in which her efforts had been appreciated. She particularly emphasized the exemplary way in which the students from the schools had behaved at one of the lectures they attended, and said it reflected great credit on the teachers.

Tar Propaganda.

Negotiations have been completed for the public exhibition of the British Road Tar Association's short version talking film " Tar " at 300 cinemas throughout the country. The following is the second list of bookings—three days' showing at each theatre unless stated otherwise. The first list appeared in the " Journal " for May 4 last.

JUNE 13.

P.C.T., Ashton.

JUNE 16.

The Palace, Swindon.
Broadway, Bootle.
Trocadero, New Brighton.
Marina, Seacombe.
P.C.T., West Hartlepool.
P.C.T., North Shields.
P.C.T., Wallsend.
P.C T., Ilfracombe.

JUNE 20.

Belle Vue, Weymouth.
Lyric, Guernsey.
P.C.T., Leicester (6 days).
P.C.T., Nottingham (6 days).
St. Georges, Bradford (6 days).
P.C.T., Sheffield (6 days).
P.C.T., Gosforth.
P.C.T., Leeds (6 days).
P.C.T., Monmouth.

JUNE 23.

P.C.T., Heaton.
Electric, Burton.
Bedford, Liverpool.
Picture House, Salisbury.

JUNE 27.

P.C.T., Cinderford.
Super, Birkenhead (6 days).
P.C.T., Dudley (6 days).

JUNE 27 (*continued*).

P.C.T., Hanley (6 days).
Electric, Barnsley.
Majestic, Hull (6 days).
P.C.T., Wakefield.
Gaumont Palace, Birmingham (6 days).

JUNE 30.

P.C.T., Barnstaple.
P.C.T., Cirencester.
Magnet, Liverpool.
Picture House, York.
Pavilion, Middlesbrough.
Rivoli, Liverpool.
Corona, Liverpool.

JULY 4.

P.C.T., Lydney.
Hippodrome, Stoke.
Scala, Harrogate.
Majestic, Doncaster.
Grand, Gainsborough.

JULY 7.

P.C.T., Chippenham.
P.C.T., Thornley.

JULY 11.

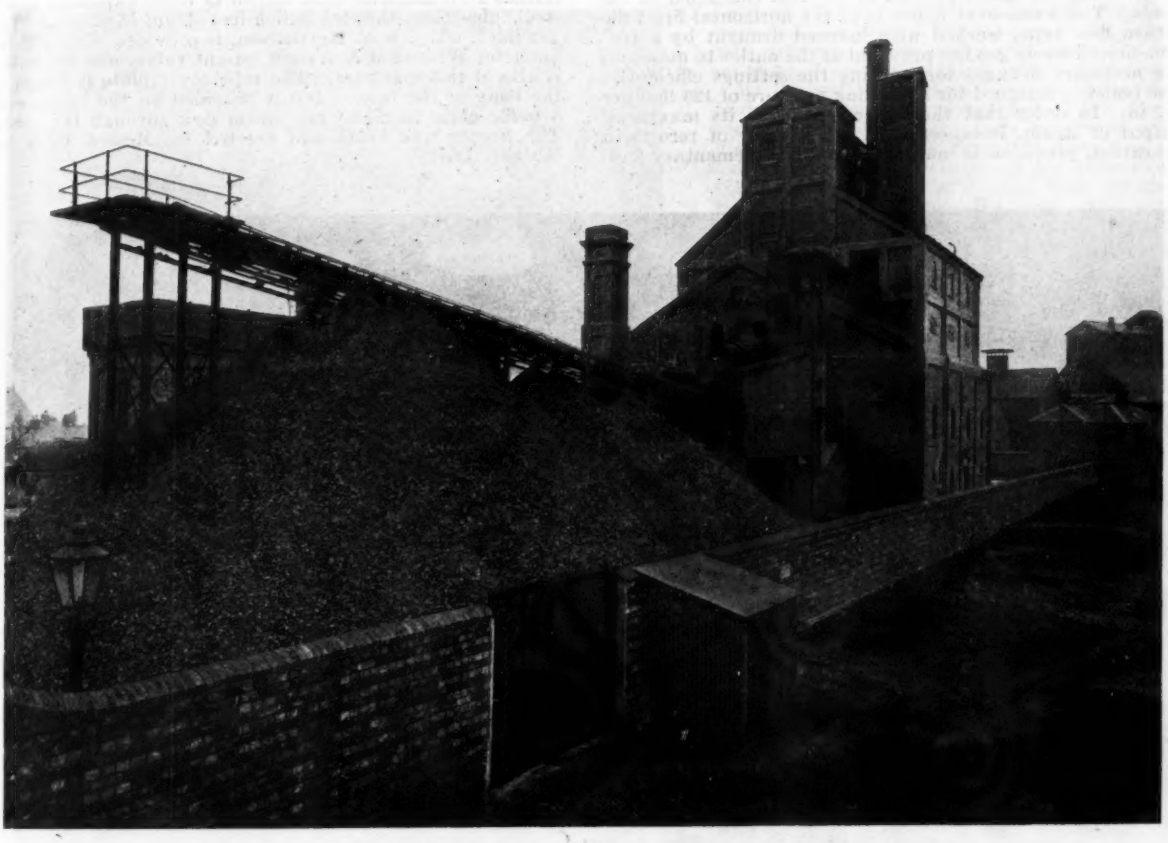
Assembly, Leeds.

JULY 14.

Exchange, Northampton.
Park, Birkenhead.
P.C.T., South Shields.

UPWARDLY-HEATED CONTINUOUS VERTICALS

Inauguration of a New Woodall-Duckham Installation at Shrewsbury



GENERAL VIEW OF NEW CARBONIZING PLANT.

The New Plant.

The installation consists of one bench of twelve latest type upwardly-heated Woodall-Duckham continuous vertical retorts capable of carbonizing 80·4 tons of coal and of producing 1,460,000 c.ft. of gas a day. The retort bench is heated by a battery of two producers situated at the ground floor level at one side of the bench. A steel-framed brick panelled extension has been added to the existing retort house to enable it to accommodate the new installation. The installation and retort house are so arranged that additional retorts can be installed, when required, without interfering with the operations of the present retorts. The twelve retorts are arranged so that any one retort can be heated up, cooled down, or scurfed without affecting the others, and in addition transverse air-cooled division walls are built between each group of four retorts, so that a complete re-setting of a four-retort group can be carried out when necessary without interfering in any way with the working of the other retort groups.

Each retort is about 25 ft. high and of rectangular tapered shape, having a major axis of 62 in. and a minor axis of 10 in. at the top.

The retort design is in accordance with the latest Woodall-Duckham practice, into which a number of special features have recently been introduced. While retaining the well-known vertical flue construction, which lends rigidity to the retort structure and also facilitates inspection from one level, the combustion of the heating gases takes place in an upward instead of in a downward direction. This produces a zoning of heats which has been found to give perfectly regular travel of the coal; less scurf formation, and less loss of time at scurfing periods; and better steaming conditions.

This system of upward heating in vertical flues which follows the natural flow of the hot combustion gases is particularly simple to put into operation and control. When the heats have once been regulated, only the steam pressure injecting the primary air to the producers and the waste gas dampers need adjustment.

Coal is discharged by hand into an existing receiving hopper inside the existing coal store at floor level. From this hopper it is fed by a jigging feeder into a 12-15 ton-per hour two-roll breaker, small coal passing through a screen in the feeder into a by-pass chute connected to the delivery chute under the breaker. The broken coal, together with the small coal by-passing the breaker, is fed directly into one of the existing 15-ton per hour bucket elevators, which delivers it into a second existing 15-ton per hour bucket elevator, which has been re-erected to take the coal and deliver it on to a push-plate conveyor arranged along the top of the overhead storage hoppers above the bench. This push-plate conveyor, which was dismantled from the coal store and re-erected in its present position, distributes the coal to the overhead storage hoppers as required.

The collecting mains are of the dry type, and as the gas enters the mains it is sprayed with hot ammoniacal liquor by a spray fitted into the top of the main beside each gas inlet. Each collecting main has a fall from each end towards the centre, at which is situated a cleaning well, where the hot liquor and the heavy tar deposits collect and can easily be removed. This well is provided with a weir over which the liquor flows to a tar and liquor separating tank. In this tank the tar is deposited and rises over an adjustable weir, whence it flows to the tar well. The decanted liquor passes through screens into a separate compartment, from which it is pumped back to the sprays in the foul main. Two belt driven rotary pumps are provided for this purpose, one acting as stand-by to the other. In this manner there is constituted a closed ammoniacal liquor circuit, and a regular supply of hot liquor is ensured.

The gas passes from the collecting mains through uptakes into a foul main. The pull on the retorts is regulated by

an existing retort house governor which has been fitted with "Arca" regulating mechanism.

To supply the gas for heating the retorts two producers are provided at the retort house floor level at one side of the bench. The producers are arranged so that one producer may be shut down without interfering in any way with the working of the other producer. The gas from either of the producers may be taken to the heating flues of any of the retorts.

The waste gas main conveys the gases either directly to the chimney or to a waste-heat boiler, which is provided for utilizing the major portion of the heat contained in the gases. The waste-heat boiler is of the horizontal fire tube return flow type, worked with induced draught by a turbine-driven waste gas fan provided at the outlet to maintain the necessary draught for working the settings efficiently. The boiler is designed for a working pressure of 120 lbs. per sq. in. In order that the boiler shall give its maximum output of steam, irrespective of the number of retorts in operation, provision is made so that a supplementary supply of producer gas can be mixed with the waste gases before they are passed to the boiler.

Coke Handling Plant.

The contents of the coke chambers below the retorts are discharged into specially designed side discharging skips running on rails laid in the floor underneath the retort bench. When dealing with coke required for the producers, the skips are run into a 25-cwt. lift and elevated to the producer charging platform level. When dealing with the surplus coke, the skips are run into the lift and are raised to the level of an elevated coke gantry, along which they are run, and are then discharged on to an existing screen arranged over an existing battery of outside storage hoppers.

A "Neckar" water softening plant is erected between the boiler house and retort house for treating the feed water to the boiler plant.

Ancillary Plant.

A cyclone tar extractor is installed which was made and erected by Messrs. C. & W. Walker, Ltd., of Donnington, nr. Wellington, Shropshire. The extractor is capable of dealing with 1½ million c.ft. of gas per 24 hours. The same firm were also responsible for the manufacture and erection of a water cooled condenser. This, too, has a capacity of 1½ million c.ft. per 24 hours. It consists of an all-steel electrically welded vessel 16 ft. 2¼ in. high by 5 ft. 9¾ in. inside by 6 ft. 4½ in. between tube plates. There are 600 steel tubes 3¼ in. outside diameter.

To raise the temperature of the gas before it enters the purifiers a steam-heated gas heater has been provided. The illustration shows it connected to the inlet pipe leading to the Weck centre valve. The heater has a capacity of 1½ million c.ft. per 24 hours, and consists of a cast-iron body 1 ft. 8 in. diameter by 5 ft. 8 in. long. It is provided with sixteen 1 in. diameter solid drawn U tubes expanded into a steel tube-plate, through which live steam is passed. The gas inlet, which is at the bottom, is provided with a 15 in. diameter Westwood & Wright patent valve, and the outlet is also of this diameter. The tube cover plate is bolted to the body of the heater and is provided on the inside with a baffle plate to direct the steam flow through the tubes. The heater was made and erected by Messrs. C. & W. Walker, Ltd.

TOP CHARGING PLATFORM, SHOWING AUXILIARY COAL HOPPERS, GAS OFFTAKES, COLLECTING MAIN, AND GAS UPTAKE.

The duplicate exhausters supplied and erected by the Bryan Donkin Company, Ltd., of Chesterfield, are of the Bryan-Donkin four-blade type capable of passing 70,000 c.ft. of gas per hour at 85 r.p.m. against 30 in. pressure. Each is driven by a Donkin horizontal steam engine fitted with two flywheels, also with Meyer's expansion gear, metallic packing, and mechanical lubricator.

Fifty Years' Progress.

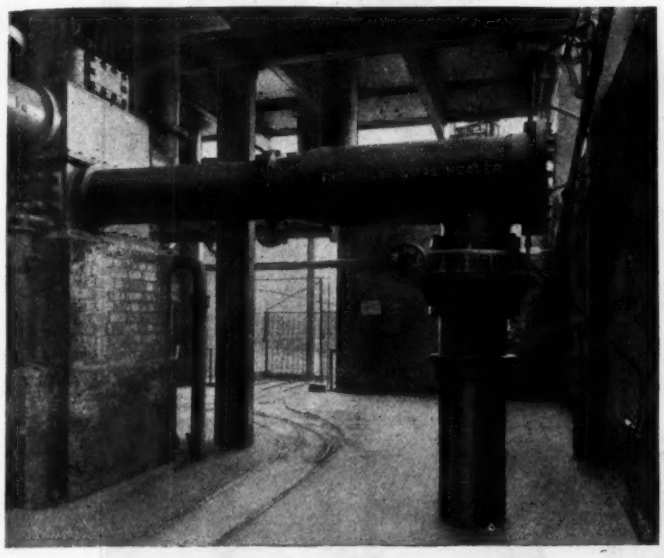
The business of the Company has progressed steadily in spite of many vicissitudes. The competition of electricity for lighting has, of course, been very severe, but electricity cannot compete with gas in other directions; hence the Company's business is continually increasing. This is strikingly evidenced by the following figures which show the rate of increase at ten-year intervals during the last fifty years. Each figure represents the volume of gas manufactured in the space of twelve months:

During the year	1880-81	95,876,800 c.ft.
,, ,,	1890-91	133,468,100 ,,
,, ,,	1900-01	165,005,300 ,,
,, ,,	1910-11	207,569,200 ,,
,, ,,	1920-21	234,130,300 ,,
,, ,,	1930-31	332,309,000 ,,

The Shrewsbury Gas-Works is divided into two distinct

sections. The older site, which is somewhat congested, was equipped with up-to-date plant in 1920, and the newer site, upon which works were built in 1903, has now been modernized by the replacement of inclined retorts with the new plant.

The development of the distribution side of the Company's activities has necessitated the purchase of additional property to accommodate this department. Premises adjoining the old works were purchased two years ago, and have been adapted for this purpose, so as to facilitate the rendering of the best possible service to consumers.



GAS HEATER.

The Company's showrooms in the centre of the town were modernized in 1922, and provide a permanent exhibition of the latest gas appliances.

FORMAL INAUGURATION.

The formal inauguration of the plant, which took place on Thursday last, was the occasion of a pleasing little ceremony, which was notable in more than one respect, but particularly because of the emphasis it laid on the excellent relations which subsist (as has been the case in the past) between the Shrewsbury Corporation and the Gas Company. Here are the very best of friends, working one and all in the interests of the public of Shrewsbury. The Corporation have an electricity undertaking of their own, but this does not, as it certainly should not, blind them to the inestimable advantages conferred on the town by a well-administered, progressive Gas Company.

A party of about seventy, consisting largely of Councillors and public officials, assembled at the gas-works, where Mr. C. M. D. Belton, the Company's zealous Engineer, Manager, and Secretary, gave some interesting details of the new plant, and showed the need for these extensions. One fact only need be mentioned here—namely, that the volume of gas manufactured during the year 1920-21 was 234,130,300 c.ft., whereas by the year 1930-31 it had increased to 332,309,000 c.ft. The Mayor (Alderman W. M. How) was invited to cut a ribbon which had been fixed across the entrance to the lift, but before doing so he made some complimentary remarks with regard to the Gas Company, and voiced sound opinions relative to the wisdom of leaving certain things to private enterprise, rather than overburdening officials and public authorities with all kinds of tasks which had no real relation to the duties of local government. Thereafter an inspection of the works took place.

This function at the works had been preceded by a very enjoyable luncheon at the Raven Hotel, which was presided over by Mr. R. D. Bromley, Chairman of the Shrewsbury Gas Company, who was supported at the top of the table by, among others, His Worship the Mayor: Mr. J. H. Canning, President of the Institution of Gas Engineers; Dr. E. W. Smith, Director of the Woodall-Duckham Company; Alderman George Clark, Managing-Director of the Bryan Donkin Company; and Mr. R. J. Milbourne, Managing-Director of Messrs. C. & W. Walker, Ltd.

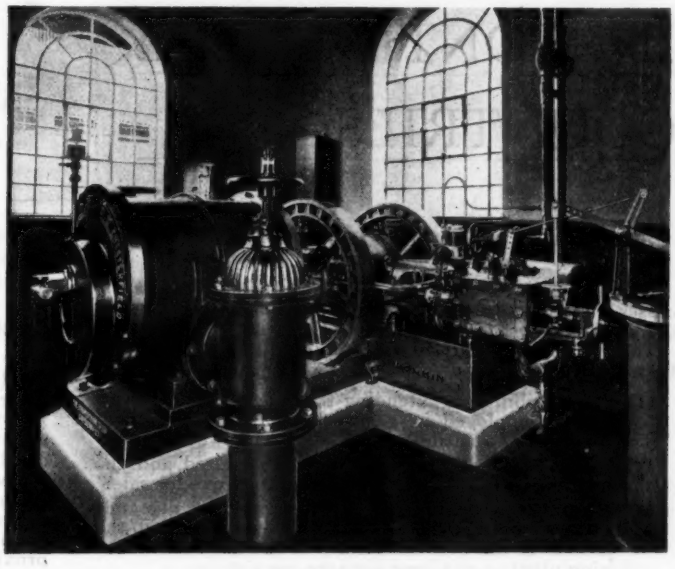
The toast of "The Mayor and Corporation of Shrewsbury" was proposed by Alderman George Clark, who remarked that the Company's competent and esteemed Engineer, Mr. Belton, was one of the most respected men in the Gas Industry. Referring to Shrewsbury's glorious past, he said that unless a town was actuated by a modern spirit, history did not nowadays count for very much. He was glad to see that the Mayor was present to associate himself with the Gas Company of the town. It was pleasing to gather that gas and electricity in Shrewsbury were working in close co-operation. Replying, the Mayor declared that the Corporation had always been on the very best of terms with the Shrewsbury Gas Company. The success of the Company was appreciated by the Corporation almost as much as if the undertaking belonged to them.

Mr. Robert Williams (a Director of the Shrewsbury Gas Company) submitted "The Contractors," who had brought their gas-works entirely up-to-date. The work they had done was excellent, and it was the wish of his colleagues on the Board that he should voice their satisfaction to those who had done the work, and to their Engineer and Manager who had supervised it.

Dr. E. W. Smith, replying, said it was a source of great satisfaction to the contractors to know that the Shrewsbury Gas Company were pleased with the plant that had been installed, and they were confident that, in the hands of Mr. Belton and his staff, the best possible results would be obtained from this plant. He remarked that, by making the fullest use of the facilities available, and by working together to the utmost possible extent, the Industry might look forward to still greater development in the future. Two things on the technical side which would help to this end were the application of gas to central heating and to industrial purposes. These two applications would be facilitated by the solving of two problems—the attainment of higher efficiencies in the equipment used, and the introduction of a more modern method of charging for gas. It was a great pleasure to him, on behalf of the various contractors, to present the Chairman with a token of their appreciation in the form of a silver salver.

This the Chairman suitably acknowledged.

The final toast was that of "The Shrewsbury Gas Light Company," which was proposed by Mr. J. H. Canning, who remarked that the Gas Industry in general could say that its product had entered so closely into the lives of the people as to form an integral part of our civilization.



EXHAUSTER HOUSE.

He complimented Shrewsbury upon having at the head of their gas undertaking Directors who possessed energy and foresight. The excellent relations subsisting between the Shrewsbury Corporation and the Company reflected credit on both parties. This was as things should be. They were all acquainted with the engineering and administrative skill of their good friend Mr. Belton. The reply was by Mr. R. D. Bromley, who in a few genial words expressed the appreciation of himself and his colleagues of all the kind things that had been said that day.

VIEW OF THE SHREWSBURY GAS-WORKS FROM THE PURIFIERS, SHOWING RETORT HOUSE, ENGINE HOUSE, SCRUBBERS, &c.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

COMPLETE GASIFICATION FROM THE ASPECT OF GAS-WORKS PRACTICE.

L. Litinsky in "Feuerfest," 1932, 8, 49-56 (April), discusses the economics of the complete gasification of coal by the double-gas process.

The advantages claimed for complete gasification have been:

(1) The possibility of extending the range of coals which can be employed in gas-works—namely, by use of coals of low volatile content.

(2) A decrease in the amount of coal required and the securing of control over the amount of coke for sale.

(3) Flexibility as regards the covering of peak demands with the attendant benefits of speed of starting up the process in the event of failure of the normal carbonizing plant or of a long-distance gas supply.

(4) Smaller capital charges and reduction in the cost of gas manufacture.

(5) Smallness of the ground space required.

Some of these advantages are illusory and the others can be realized by other methods—*e.g.*, by the normal system of carbonization in conjunction with water gas generators or by carbonization in vertical chamber ovens. Furthermore, complete gasification shows a lower thermal efficiency than does straight carbonization or carbonization under steaming conditions.

The conclusion is that, though complete gasification may possibly be attractive in countries in which coal is costly due to its having to be imported or transported over long distances, this does not apply to Germany.

EXTRACTION OF TAR ACIDS FROM TAR OILS BY LIQUID AMMONIA.

"Brennstoff-Chemie," 1932, 13, 172 (May 1), contains an abstract of a paper by Jarry ("Comptes Rendus," 1932, 194, 614-615) dealing with an experimental investigation of a new method for the extraction of tar acids from tar distillates or low-temperature tar. Liquid ammonia dissolves tar acids but not neutral oils. Mixtures of liquid ammonia and tar oils or tar separated into two layers, the lighter one consisting of a solution of the tar acids in liquid ammonia and the heavier one of the neutral oils and approximately one-fifth of the ammonia. Separation of the two layers occurs quickly. 500 grammes of low-temperature tar and 300 grammes of liquid ammonia yielded a lower layer of 405 grammes, from which 350 grammes of neutral oils free from tar acids were obtained when the ammonia was removed by evaporation, and an upper layer of 395 grammes which gave rise to 150 grammes of oils containing 57 p.ct. of tar acids soluble in caustic alkali.

The process may possibly be capable of technical application, since the solvent is recoverable quantitatively. The cost involves little more than that of the power required for the liquefaction of the ammonia. This, in the above example, amounted to approximately 18 watt-hours per pound of crude tar.

NOTES ON PLANT AND PROCESSES

Richmonds "Newlyn" and "Lynton."

New and Important Features.

If a gas appliance be made which is effective and efficient, and if it also enhances the convenience and health of home life, then it is sure to meet with popular approval and it will be sought for and purchased. This is what has happened in the case of the "Newlyn" and "Lynton" water heaters manufactured by Richmonds Gas Stove Company, Ltd., of Warrington and London.

These two small storage water heaters, for use over the scullery sink or wash basin, have created for themselves a

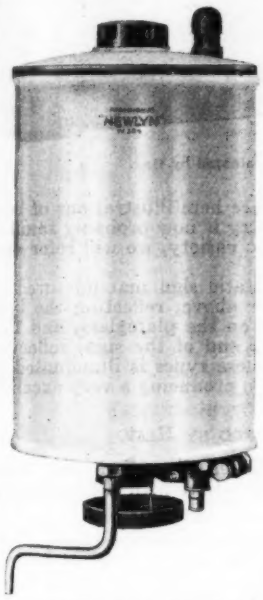


Fig. 1.—Richmonds "Newlyn" Thermal Storage Gas Water Heater.

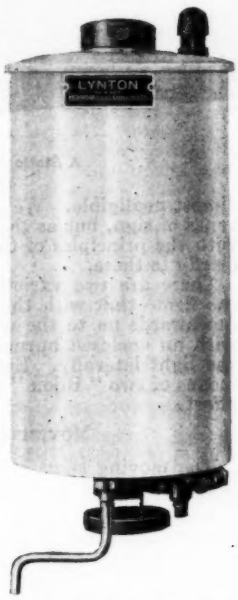


Fig. 2.—Richmonds "Lynton" Automatic Gas Water Heater.

very wide and gratifying demand, due in no small degree to the original "Lyn" sink boiler which was first introduced by Richmonds nearly twenty years ago and to Richmonds' enterprise in evolving and developing this type of heater along sound and comprehensive lines.

The following new and improved features now introduced are common to both the "Newlyn" (which is the lagged heater) and the "Lynton" (which is single-cased). They signalize developments which will still further popularize these two well-known water heating appliances.

Gas and Water Controls and Connections.

A single unit has been devised to accommodate the thermostat valve (G.B. patent applied for), the by-pass flame control, and the adjusters for gas and water pressure.

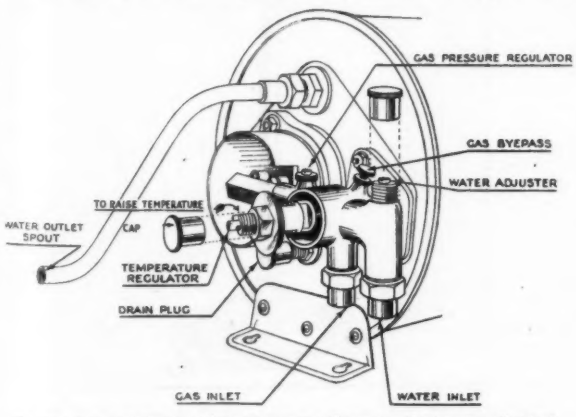


Fig. 3.—Base of Heater ("Newlyn" and "Lynton") showing Control Points, all of which are accessible from the front.

All the controls are accessible from the front of the heater. A further striking development is that the valve of the thermostat is now detachable for inspection or cleaning without interference with the temperature adjustment. Fig. 3 shows the base of the heater and the position of the various controls. The valve is shown withdrawn. The single unit which embodies the controls and the jointing ring are bolted direct, through the base of the heater, to a brass stamping inside, thereby increasing the strength and stability of the whole apparatus.

The gas and water connections, it will be noted, are both provided with unions ($\frac{1}{4}$-in. gas thread) which are placed side by side running in a backward direction. Fitting is thereby simplified and neat connections can be made to gas and water from below, above, or right or left hand positions.

The cold water feed is entirely new. Instead of being carried upwards, along the outside of the heater, to a filler cup at the top, the cold water feed pipe now runs through the interior of the heater direct to a new water cap (made of black, non-corrosive material) where a break in the feed releases the water in a visible stream which is directed to the base at a point where the thermostat rod enters the heater. This arrangement greatly improves the general appearance of the apparatus by eliminating external water pipes. It also reduces the over-all width.

The Combustion Chamber.

The combustion chamber has been lengthened at the base (to protect the burner against draughts) and also extended through the top of the heater further to simplify maintenance. The top of the combustion chamber is fitted with a new type of ventilating cap, made of strong non-corrosive

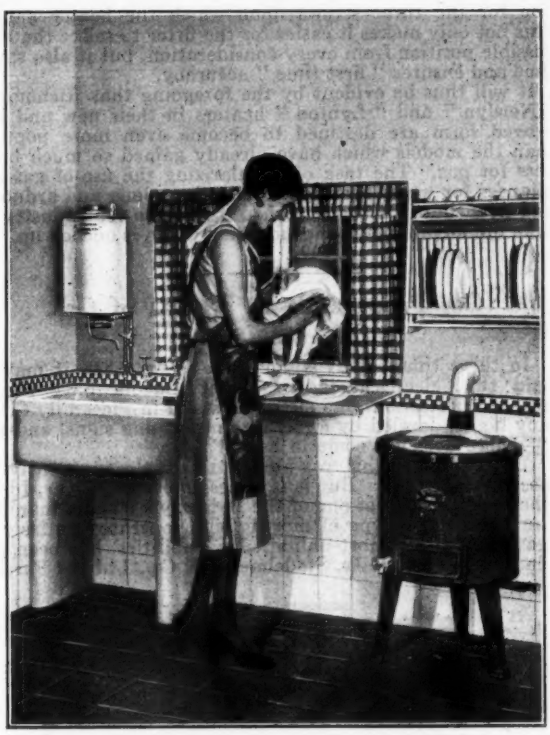


Fig. 4.—Richmonds "Newlyn" Thermal Storage Gas Water Heater fitted over a scullery sink.

material. This cap adds to the pleasing and symmetrical appearance of the heater.

The "Newlyn" is provided with a separate attachment which prevents loss of water by evaporation and also serves to insulate the top of the heater. These advantages are also incorporated in the "Lynton" heater.

The baffler is readily removed from the top of the heater for inspection. To meet fluctuations in pressure the baffler has been designed to secure maximum heat transfer over a wide consumption range. A high standard of combustion is attained even at over-load consumptions—a vital feature in the performance of a flueless apparatus.

Fittings and Finish.

Reference has already been made to the special non-corrosive material of which the flue cap and the water feed cap are made. The small condensation tray at the base is also made of this same strong, ebony-black substance which is unaffected by condensate. The chromium-plated hot water outlet pipe is fitted in a central position to facilitate

the hot water delivery to right or left hand side of the heater as most convenient when fitting.

The improved pattern "Newlyn" and "Lynton" heaters are supplied in distinctive finishes. The "Newlyn" now has a white, porcelain enamelled exterior which is relieved by a narrow black band round the rim at the top. The "Lynton" (which is the unpacked heater) is finished in cream enamel. Both finishes present a most clean and pleasing appearance, and the ease with which they may be kept clean and smart is a feature which strongly appeals.

Full-on and Maintenance Gas Consumptions.

The full-on hourly gas consumption of the "Newlyn" and the "Lynton" is 5000 B.Th.U. It takes approximately 40 minutes to heat the 2¼ galls. storage to about 140° Fahr., the gas consumption being 3000 B.Th.U. The cut-down gas consumption to maintain the water storage at this temperature is a fraction below 1 and 2 c.ft. per hour for the "Newlyn" and "Lynton" respectively. This is a feature which appeals very strongly to consumers. In actual practice it means that, during part of the day when hot water is not likely to be required, the gas is left alight at a cut-down consumption (the cost of which is negligible) which maintains 2¼ galls. of water at approximately 140° Fahr. ready for instant use. This is as it should be, and it is due in no small measure to advantages of this kind that gas is now making such gratifying progress in the provision of domestic hot water supply.

All fitting staffs will welcome the addition of a special fitting template which will in future accompany each "Newlyn" and "Lynton." When the fitter has decided upon the most suitable position for fixing the heater, he simply places this template sheet flat upon the wall and marks (through holes punched in the sheet) the exact position for the three screws upon which the heater hangs. This not only makes it easier for the fitter to select the best possible position from every consideration, but it also saves time and ensures "first time" accuracy.

It will thus be evident by the foregoing that Richmonds "Newlyn" and "Lynton" heaters in their new and improved form are destined to become even more popular than the models which have already gained so much business for gas. The task of popularizing the use of gas appliances for water heating has been both long and arduous, and now that it is accomplished it is up to the Industry to take full advantage of this new field which is opened up.

Gas Propaganda by Means of Gas.

Moving Signs.

In these times of dynamic advertising, when it may be said that electrical light publicity media have almost reached perfection, one may well stand in Piccadilly Circus any night, dazzled by a plethora of flashing signs, and ask, "Where does gas come in here?"

Until recently this was an electrical field apparently unassailable by gas. But it is unassailable no longer, for by the good services of one of the Industry's leading manufacturing firms, a type of moving sign, operated entirely by gas, and with almost unlimited possibilities, has been produced. Messrs. Falk, Stadelmann, & Co., Ltd., of Farringdon Road, E.C. 1, who are responsible for this innovation, are to be congratulated upon providing a new use for gas—and one which should be of considerable value to the Industry in the future.

A Falk-Stadelmann Moving Gas Sign.

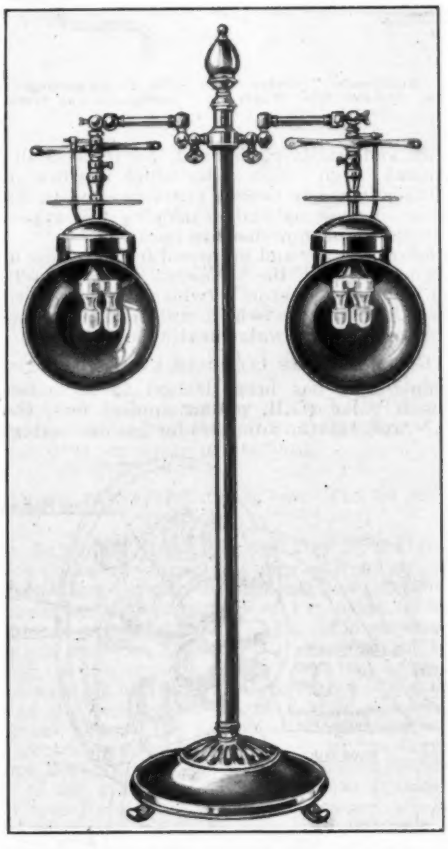
We had the opportunity of inspecting some examples of these signs, both moving and otherwise, at Messrs. Falk, Stadelmann's showrooms, and were surprised at their simplicity—which in itself detracts in no way from their reliability. They are, in point of fact, foolproof; there is nothing to go wrong; while the cost of operating them is almost negligible. We reproduce here illustrations of both types of sign, but as the Industry is now probably familiar with the principles of the static variety, we will refer only briefly to these.

A Static Sign Illuminated by Gas.

There are two varieties of static sign manufactured by the firm—that with the burner above, reflecting the light downwards on to the wording on the plateglass, and that with an enclosed burner either end of the sign, reflecting the light laterally. Each of these types is illuminated by means of two "Bijou" mantles, producing a very excellent effect.

Movement Created by Heat.

The moving signs are very interesting, and these again are divided into two main types—that with the wording to be reproduced cut out of a metal sheet immediately behind the front screen; and that with a plain opal screen and the wording stamped out of the revolving cylinder within.



High Power Gas Lamp for Floodlighting Interiors of Showrooms.

A metal box, ventilated above and below, and with a movable front screen, constitutes the foundation of the sign. Inside this box is a gas burner with mantle, varying in size according to the size of the cylinder it has to revolve, the smallest being the firm's "Pearl" upright mantle, which is quite sufficient for working all ordinary small signs. Supported centrally above the burner, lightly balanced upon a pin, is the cylinder, the top of which is louvred so that the heat rising from the gas burner causes the whole to revolve—quickly or slowly as desired according to the adjustment of the louvres. The gas supply to the signs is controlled by pneumatic switch.

In the case of the first example (where the wording is cut out of a metal sheet behind the front screen) the cylinder is made of mica, being in part coloured diagonally and the rest blanked out in steps in such a way as to cause the slogan to appear in continually varying colours on the front screen a line at a time as the cylinder revolves. In the other case the words to be reflected on to the screen are cut out of the cylinder itself, producing a dissolving effect. .

The apparatus is extremely simple, and with a very small consumption of gas—in the case of the "Pearl" mantle and burner no more than 1 c.ft. an hour—the sign will continue to operate just as long as the gas is on. Also, in addition to the small initial cost of the whole apparatus, the wording can be changed frequently and very easily—merely by stamping out fresh slogans on the tin sheet or cylinder respectively. There is a wide field for the use of these signs not only in the gas showrooms, where they will be valuable in attracting public attention, but there is no reason whatever why they should not be extended to a much wider field still for cheap and efficient general advertising purposes. But for the Gas Industry this is the cheapest and most effective way of using gas for advertising gas, and we understand that the Industry is already taking a keen interest in this striking method of publicity.

FLOODLIGHTING FOR THE SHOWROOM.

Another interesting appliance for display purposes recently produced by Messrs. Falk, Stadelmann, & Co. is a powerful double burner adjustable standard lamp in chromium plated finish. Each of the two "Superay" burners, which can be pivoted to direct a 300-c.p. beam *in any direction*, has three Alpha silk "daylight" mantles, while a departure has been made from the usual parabolic reflector, and a type of directive reflector is incorporated which has the feature that when one looks into it, one cannot see the actual mantles at all, but only a ball of light.

This installation is valuable for concentrating a powerful beam upon any one particular appliance in a showroom, which it is desired to emphasize by display, or upon two, three, or a whole row of appliances as required.

Eliminating Friction.

A new leaflet published by the Hoffman Manufacturing Company, Ltd., of Chelmsford, describes an entirely fresh development of ball and roller bearings whereby anti-friction principles can be applied to straight-line motion as readily as to rotary motion. The pamphlet shows the simplicity of the idea.

No doubt these friction eliminators will find their chief field in carrying heavy reciprocating parts. One advantage which may be mentioned is that the points of support may be fixed in relation to either the moving or the stationary part, as the requirements of the machine may determine.

Smith "Radial" Gas Meters.

We have received from Messrs. Smith Meters, Ltd., of 186, Kennington Park Road, S.E. 11, a copy of their interesting brochure dealing with their "Radial" ordinary and prepayment gas meters.

The latest development which this progressive firm have introduced into the design of their meters is in the mechanism of the slide valves, which have a "radial" or pivotal movement and operation. The distinguishing advantage of this "radial" drive, as compared with the old reciprocating type, state the firm, should be readily admitted; it is, to use a homely simile, like the use of a capstan in place of directly hauling a load.

The booklet goes on to describe and illustrate the valve lay-out, showing how the oscillating radial motion tends to shear any deposit from the valve faces and remove all longitudinal side thrust. This design permits larger valves to be used per external dimensions of the case, thereby reducing the differential pressure. Tests of these valves, it is stated, were made in an open workshop, where a considerable amount of grit and dust existed, at a speed of 28,000 movements per hour of the valve cover across the valve grid. A total of 8,000,000 movements in all were made, and at the end of the test the valves were perfectly sound with no sign of wear. Tests were also made with gas with similar results. The normal speed of each valve in a high capacity meter, of course, is in the region of 800 movements per hour. Graphs are shown indicating test results at pressure absorption at various loads.

Further illustrations show the simple manipulation of the mechanism for change of coin denomination, while a number of tables give full specification of the various capacities of meters both ordinary and prepayment.

Some Results of Gas Drying.

We have received from Messrs. W. C. Holmes & Co., Ltd., of Huddersfield, a copy of a folder issued to the Gas Industry to mark the completion of their largest "Dri-Gas" installation at the Beckton Station of the Gas Light and Coke Company.

The experience gained in over five years of distribution of moisture-free gas is referred to in facsimile reproductions of communications received from a number of engineers. For example, the Taunton installation, which was the first of a total of eighty-five plants installed to date, has been the means of securing a total cessation of the use of service pumps and consumers' complaints have become very rare indeed. Meter repairs, as shown by the accounts of the meter manufacturers who have a contract for repairs and replacements, have been reduced to less than 30 p.ct. of what they were six years ago.

A number of the original "Dri-Gas" installations have now been equipped with the Holmes' patent oil regenerating unit, which automatically strips the wash-oil of both naphthalene and benzole, with practically no additional labour, and, by an increased oil throughput, considerable additional revenue is being obtained from the sale of the high-test benzole recovered. The tax on imported motor fuel makes the present price of benzole per therm, sold as such, much higher than the price which can be obtained for it when sold as gas.

A Century of Firebricks.

Firebricks with a century of experience behind them is a claim that can justly be made for their products by the Glenboig Union Fireclay Company, Ltd., of 48, West Regent Street, Glasgow, C. 2; for 100 years ago the first batch of "Glenboig" firebricks was despatched. That shipment marked the birth of a product that is now known the world over.

We have received a copy of a booklet published by the Glenboig Company to accompany a display shipment of refractories on board s.s. "Letitia"—the ship which, it will be remembered, was chartered for the Scottish-Canadian mission. This interesting booklet describes and illustrates some of the processes carried out at the Glenboig works. One photograph shows a set of continuous gas-fired kilns, while it is stated that the special clay-seam owned and worked exclusively by the Glenboig Union Fireclay Company produces a fireclay peculiarly fitted for the manufacture of gas retorts. It is claimed that retorts made with this fireclay are capable of resisting greatest heats and most rapid changes of temperature. Glenboig gas retorts have been known to stand 2380 working days—nearly seven years.

Two interesting graphs included in the booklet indicate the thermal expansion of "Glenboig" bricks and the uniform manner in which the material expands under heat; and a further example showing the behaviour of the bricks when subjected to both load and heat. The analysis and physical results of the bricks are also given.

A Glass-Fronted Cooker Oven.

An interesting and practical improvement has been made to their "Equi-heat" cooker by the Vulcan Stove Company, Ltd., of Exeter. The oven door is now fitted with "Armourplate" fireproof glass, enabling the housewife to see how cooking operations are progressing, without the necessity of opening the door.

The special "Armourplate" glass used for the door is constructed to resist violent shocks and unequal pressure, and it will withstand wide differences of temperature on its two surfaces without breaking. The glass door does not discolour in use, and the construction prevents it becoming steamy after the first heating up. The glass window con-

sists of double plates of glass with an air space between each thickness, thus maintaining excellent insulation.

A serviceable set of "Orlak" glass ovenware (four utensils) is supplied with the cooker, these utensils being guaranteed for two years against breakage through oven heat.

The cooker is finished in "Ceramic" porcelain enamel and is fitted with thermostat automatic oven control. Embodying so many time and labour saving improvements, it is sure to make an instant appeal to the practical housewife.

A New Cooker Catalogue.

The new features in the latest gas cooker catalogue recently published by the Davis Gas Stove Company, Ltd., of 7, Stratford Place, W. 1, include the "Beau" green "Alpine" "New World" cookers, which are illustrated in actual colours and make a very attractive piece of apparatus for the kitchen.

This booklet gives details of the various features of the firm's cookers, mentioning the "Rado" burners, "discbar" hotplate, "Vertico" safety tap, and automatic oven heat control. Different designs of hotplates are shown, while full particulars and specifications are given of the various ranges of cookers. The "Front Line," the "Era," and other "New World" appliances are dealt with, and a comprehensive section deals with the oven and its proper use. Scientific accuracy, it is stated, is the method of the "Regulo." It does away alike with watching and with guesswork.

A further interesting appliance by the Davis Gas Stove Company is the "Nautilus" domestic coke boiler, which is produced in an exact match of the "Beau" finish of the "Alpine" gas cooker. Not only does this boiler give a plentiful supply of hot water throughout the house, but it warms the kitchen as well. Finished in porcelain enamel—green and white—the "Nautilus" has a delightfully bright and attractive appearance and is easily cleaned and kept clean.

Other special features are rotating fire-bottom bars which enable the fire to be cleaned without dust escaping into the kitchen; steel construction which ensures that the boiler will not fracture; economical damper control that gives fine adjustment of the fire.

Powdered and Granulated Aluminium.

A very attractive brochure has been published by the British Aluminium Company, Ltd., of Adelaide House, King William Street, E.C. 4, on the subject of powdered and granulated aluminium, and a number of excellent illustrations show examples of the varied applications of these products.

The dividing line between finely granulated and powdered aluminium is not very clearly defined, but, in general, the former term is applied to material produced by blowing molten metal or by grinding in grinding mills; while the latter is generally understood to refer to material produced by stamping small pieces of thin sheet into an impulpable mass, with periodic sievings and subsequent grading.

Probably the largest use of aluminium powder is for making metallic paint, either in its natural colour or tinted with aniline dye to obtain gold, bronze, and other effects, and the brochure goes on to outline some of the uses of this paint. These may be summarized as follows: As a decorative medium; protective coating; light reflector; heat reflector; heat conservor; waterproofing medium; and a primer. Details of the mixing of the paint are given and also particulars of the paint vehicle, to which, it is stated, too much importance cannot be attached. Methods of applying the paint are also dealt with, while a comprehensive list of the applications is interesting.

Aluminium paint differs fundamentally from ordinary paint in that the particles of the pigment are not granular, but are extremely thin flakes which, owing to their thinness and lightness, have the property of rising to the surface of the medium and "joining hands" under the influence of surface tension, thus forming a series of thin metallic layers having the properties of a sheet of metallic foil.

The brochure goes on to deal with other uses of aluminium powder, among which the following may be mentioned: Calorizing; explosives; alumino-thermics; pyrotechnics; precipitation; metal deposition; and aerated concrete.

British Glassworks Large Stock Yards.

The accompanying photograph is of one of the six large stock yards of Messrs. Hailwood & Ackroyd, Ltd., of Morley, near Leeds, showing the immense amount of glass and space needed to handle present modern requirements, especially of illuminating units which are so bulky to stock. In addition to the stock shown on these photographs the firm have a number of very large buildings all full of glassware.

The difficulty in dealing with illuminating glass-making is that if there is a lull or setback in the orders received, such, for instance, as followed the dropping of the tariff from 50 p.ct. to 20 p.ct., the quantity of glass produced per day in a large modern glassworks is so enormous that acres of ground can quickly be covered. Fortunately, from the user's point of view, the stocking of the glass for a while at the works enables it to get well tested with weather conditions—or shall we say "weathered"—and is, therefore, not so likely to break afterwards in the hands of the customers.

ONE OF MESSRS. HAILWOOD & ACKROYD'S SIX LARGE STOCK YARDS.

THE SELF-ADJUSTING : : PIPE JOINT : :

Mr. F. W. O. White, of the Stanton Ironworks Company, Ltd., describes new developments to meet modern conditions

Looking back into history, it is not surprising to learn that the Romans, with their genius for organization, realized the advantages to be gained by conveying a constant supply of water to their cities. The Romans attained a considerable degree of civil engineering knowledge, and although they lacked our methods of producing mechanical power they built some of the finest aqueducts the world has ever seen.

They knew, of course, nothing of coal gas, and their mains consisted mostly of open aqueducts for the supply of water to their cities and for agricultural irrigation, and to a lesser degree mains for the disposal of sewage, and waste water from their baths.

The First Cast-Iron Mains.

Although the discovery of gunpowder, with the resulting demand for cannon, gave a certain impetus to ironfounding, and in particular to the making of cylindrical castings, it was not until the end of the 18th Century that cast-iron pipes began to replace bored logs for the few water mains then in existence.

One of the outstanding examples of early cast-iron mains is the system of water supply to the Gardens of the Palace of Versailles. The Palace and the Gardens were built by Louis XIV., and cast-iron pipes were installed between 1664 and 1686 to provide water under pressure for the fountains. These pipes are still in use, some of them being 250 years old.

The adoption of gas lighting in London, just over a hundred years ago, and the subsequent development of the Gas Industry during the last century, created a demand for pipes. At the same time, our growing industrial civilization necessitated regular supplies of pure water and a means for the disposal of sewage. For the last hundred years gas, water, and sewage have been conveyed by cast-iron pipes, and cast-iron as a pipe material still holds its own against the newer materials, such as steel and asbestos cement, although concrete tubes are, to some extent, replacing iron pipes for sewage and other purposes where the working pressures are low.

Production Methods.

The means known to iron founders for the manufacture of cast-iron pipes were crude until the invention of the De Lavaud centrifugal casting system. The old way of casting by pouring molten metal into sand moulds was laborious and exacting on those involved in the operation; although the perfection to which this process has been brought is another example of the standard to which craftsmanship can be raised.

Joints.

The plain spigot and socket joint for use with lead, either applied hot or cold, was the most usual type of joint used with the ordinary sand-cast pipe, and it is, perhaps, surprising that this joint has survived without improvement for so many years.

The turned and bored joint has also been used extensively, and has the advantage of providing a perfectly tight joint for ordinary pressures, but suffers, perhaps, from the disadvantage that the cast-iron main becomes too rigid.

Modern road transport, which started with the tramcar and developed rapidly after the invention of the petrol engine, places an ever-increasing volume of traffic on the streets. Heavy traffic causes vibration, much of which is not absorbed by the materials of which roads are made, and passes down through the surface, tending to cause leaks at the socket and spigot joints of pipes laid underneath.

Ground Subsidence.

Apart from the danger due to vibration acting directly on pipe joints, heavy road traffic may cause a gradual settling of the soil. This is more pronounced at corners, and at cross roads where the traffic is heaviest.

Roads which are designed, in the first instance, to carry light residential or suburban traffic, may soon develop into main arteries, and bus routes. By taking up and relaying the road surface, provision can be made for the effects of increased traffic as far as the surface is concerned; but nothing short of digging up the mains and relaying them, at considerable expense, under the footpath, can even partially overcome the danger of bursts and leaks caused by the effects of ground settlement on pipes with rigid joints.

Even when this expensive course is taken, the remedy is only partial, for both vibration and settlement caused by vibration extend to some extent to the ground under the footpath, and the greater depth at which the pipes must be buried adds considerably to the cost of getting at the mains when making service connections, or when it is desired to effect junctions with other mains.

Many cities and towns in the midlands and the north have colliery workings extending under them for many miles. These workings were naturally made entirely with a view to getting coal, and in many cases, with a complete disregard to the possibility of large towns growing up on the surface. After a hundred years or so of industrialism, many of these workings, now abandoned, are slowly caving in and causing ground subsidence, the process being accelerated by vibration from heavy road traffic.

The result is that pipelines laid under the streets in these towns, and consisting of cast-iron pipes with lead socket and spigot joints, form rigid mains which will not stand the strains imposed upon them when the ground in which they are laid subsides, and the pipelines naturally suffer from leaks and bursts.

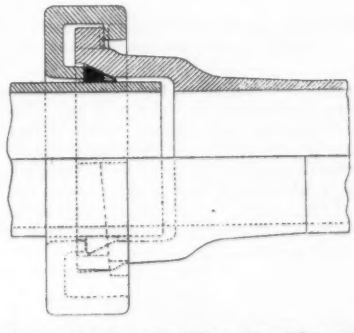


Fig. 1.—Self-Adjusting Stanton-Wilson Pipe Joint made by the Stanton Ironworks Company, Ltd.

Half Sectional and Half Outside Elevation with Ring Screwed into Position.

Cast Iron *v.* Steel.

The time has now come when, in many cases, a permanent departure from the old type of rigid main must be made. The substitution of steel pipes for cast iron would provide a partial solution of the vibration and subsidence problems, were it not that experience with steel mains during the last fifty years or so has proved that this material is by no means proof against corrosion, even when protected, and, except in very favourable circumstances, it cannot compare with cast iron for long life and reliability. The vast majority of cast-iron mains give no trouble at all from corrosion, and, apart from their joints, form ideal mains.

Self-Adjusting Joints.

In spite of the increase in the flexibility of cast-iron pipes themselves since the introduction by Stanton some eight years ago of the De Lavaud centrifugal casting system, pipes with lead joints are probably not sufficiently flexible to allow for the results of traffic vibration and ground subsidence. To provide a main that is durable, and capable of withstanding the effects of vibration and subsidence, and which can be relied upon to remain tight under all working conditions, a departure has had to be made from established practice.

The Stanton-Wilson joint (see fig. 1), although comparatively new, is extensively used in this country. It works on the stuffing box principle, and consists of a **V**-shaped rubber ring, which is compressed by a cast-iron collar into a specially shaped socket (see fig. 2), and is used with

Stanton spun-iron pipes, mass produced at Stanton by the De Lavaud system. The ring is made of a special rubber which is proof against all waters and against coal gas. To make doubly sure, however, the ring has a thick lead tip, and only the end comes into contact with the gas or water in the main. The cast-iron collar, which is also mass produced, has helical lugs, which engage with lugs on the sockets. The whole is quickly tightened up with a simple tool in a few seconds, the actual time taken for jointing, by semi-skilled labour, being but a fraction of the time taken by a skilled jointer to make a lead joint.

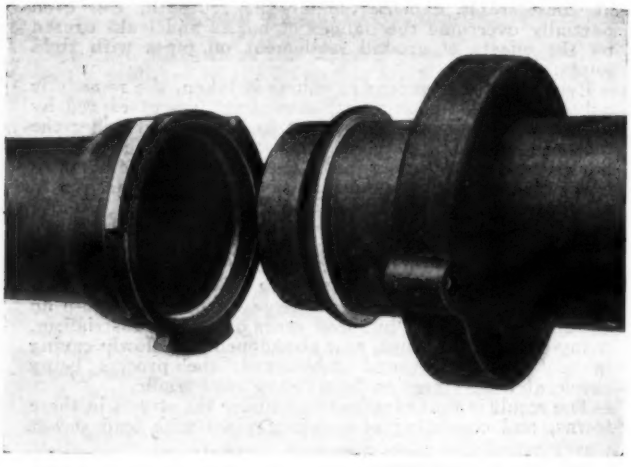


Fig. 2.—Self-Adjusting Stanton-Wilson Pipe Joint made by the Stanton Ironworks Company, Ltd.

The two main advantages of the Stanton-Wilson joint are that it enables the main to withstand the effects of traffic vibration and ground subsidence while remaining tight; and vibration is absorbed in the joint itself, and, as it permits a deflection of 18 in. in any direction for each pipe 6 yards long and allows for longitudinal expansion and contraction of the main, the joint gives what is, in effect, a flexible cast-iron main which will adjust itself to movement in the surrounding soil.

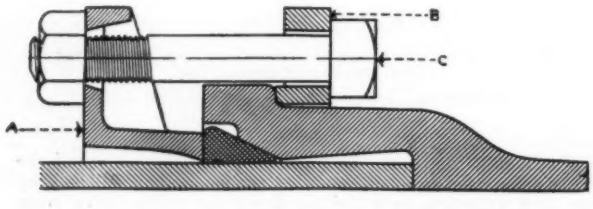


Fig. 3.—The "Anthony" Pipe Joint made by the United States Pipe and Foundry Company.

A.—Follower ring holds gasket tightly within bell.
B.—Split clamp ring.
C —Bolts hold both rings in position.

The joint is positive in action, so that it remains tight, irrespective of internal or external pressure. Less excavation of the trench, and consequently less reinstatement, are required, and the joint may be made either in the trench or above ground, the latter method being an advantage when it is desired to lower the pipeline, already jointed, into trenches cut by mechanical excavators.

The Stanton-Wilson joint has only two loose parts—the cast-iron collar and the lead-tipped rubber ring. Bolts and nuts, always liable to corrode, are not used. Gentle curves in the main may be undertaken without the use of specials, although special pipes—*i.e.*, bends, tees, angle branches, tapers, &c., with the Stanton-Wilson joint, are made to suit the pipeline.

Further Types of Joints.

Both these flexible joints work on the same principle as the Stanton-Wilson joint. The Dresser coupling is well-known in the United States and in Canada, and the Gibault joint is extensively used in France, and elsewhere on the Continent. The chief differences between these two joints and the Stanton-Wilson joint are that bolts and nuts are used in the Dresser and Gibault joints, and each have two or more collars, whereas the Stanton-Wilson joint has only one collar, and no other loose parts except, of course, the joint ring.

The Anthony joint and the Duplex-Simplex joint are made in America. The Anthony joint is used with pipes made by the United States Pipe and Foundry Company, by the De Lavaud centrifugal casting system, and the Duplex-simplex joint is made for the mono-cast sand-spun pipes of the American Cast-Iron Pipe Company. Both joints give satisfactory service under American conditions. They work on the same principle as the Stanton-Wilson, Dresser, and Gibault joints—namely, the principle of the stuffing box, and have rubber rings compressed by collars held in place by bolts and nuts. They give a considerable degree of flexibility.

Victaulic Joints.

There are two types of flexible joint operating on the principle of the hydraulic "U" washer. Both are made by the Victaulic Company. They are, first, the Victaulic joint for cast-iron pipes, and a modified but very similar joint for steel tubes, and secondly, the simple Victaulic joint for the spun-iron pipes made by the Stanton Company on the De Lavaud system. Both joints are mainly dependent for tightness on the pressure of the gas or water in the main, and the higher the pressure the tighter the joint. Victaulic joints give a considerable degree of flexibility, and the simple Victaulic joint for De Lavaud pipes allows for expansion and contraction in mains. The Victaulic joint for cast-iron pipes consists of a **U**-shaped rubber ring, suitably ribbed, which is held in place by a collar consisting of two or more pieces bolted together. It is used with double spigot pipes with machined ends. The simple Victaulic joint for De Lavaud pipes consists of a **U**-shaped ribbed rubber ring, which is placed in a groove in the socket of a specially cast socket and spigot pipe. To make the joint the spigot is simply pushed home into the socket.

The self-adjusting joint is simply a logical step in the development of pipelines. As the open aqueduct was replaced by the bored log, the bored log by the sand-cast iron pipe, and the sand-cast iron pipe by the spun-iron pipe, so the socket and spigot lead joint is being replaced by the self-adjusting joint.

New conditions have demanded a new type of joint, and self-adjusting joints have been produced to fill the demand, in the same way that the De Lavaud centrifugal casting system was invented and adopted by the pipe makers to give engineers a stronger and a cheaper pipe.

Gas Acts (1920 and 1929) Orders.

DECLARED CALORIFIC VALUE.

Folkestone Gas and Coke Company.

The Company will supply, as from Oct. 1, gas of a calorific value of 500 B.Th.U.

Houghton-le-Spring District Gas Company.

The Company give notice of their intention to supply gas of 500 B.Th.U. as from Sept. 1.

Sedgley Urban District Council.

The Council give notice that, as from Sept. 1, they intend to supply gas of a calorific value of 450 B.Th.U., in substitution for the present calorific value of 425 B.Th.U., in a portion of the Urban District.

Thornton Cleveleys Urban District Council.

Notice is given of an alteration to 450 B.Th.U., as from Oct. 1.

SPECIAL ORDERS.

Rotherham Corporation.

To empower the Corporation to purchase by agreement the undertaking of the Conisbrough Gas Company, Ltd.

Wisbech Lighting Company.

To authorize the Company to raise additional capital, to prescribe a sliding-scale, and to make other financial provisions.

South Suburban Gas Bill

(*Concluded from p. 529.*)

Mr. *George Evetts*, M.Inst.C.E. (the Consulting Engineer who had made investigations on behalf of the South Suburban Gas Company), said he had made a census of the houses in Knockholt, and had considered the question of gas distribution there. There was a main existing down to the northern border of the parish of Knockholt and the southern border of the existing area of supply of the South Suburban Gas Company, which adjoined, and, indeed, he believed the main actually extended a few yards into Knockholt. The parish was of an absolutely rural nature; he believed the majority of the houses there would take a supply of gas, if available, but some of them were so small that they would be hopeless propositions. A few of the houses contained perhaps 10 or 12 rooms each, but generally speaking the dwellings were small country cottages. He had divided the potential consumers into those who would take a supply by ordinary meters and those who would use prepayment meters; in his estimates of consumption he had assumed that the ordinary consumers would take the same amount as the ordinary consumers in the existing Sevenoaks area, and the prepayment meter consumers would take the same amount as existing consumers in the Sevenoaks area who were taking supplies through prepayment meters.

He had calculated that the development of one part of the parish would cost £4490, and the balance of profit, with a differential charge of 2d. per therm over the price charged in the South Suburban Company's area, would be £219—*i.e.*, 4·9 p.ct. on the capital expenditure. To secure a return of 6 p.ct., the differential would have to be increased to the extent of from 0·8d. to 1d. per therm. The cost of development of the whole of the parish would be £7880, and the balance of profit £283—*i.e.*, 3·8 p.ct. on the expenditure—and to obtain a 6 p.ct. return the differential would have to be increased by practically another 2d. The figures he had given covered the cost of extending the mains for the purposes of giving the supply, but did not include the cost of other work which might be necessary. He had assumed that an existing main would be sufficient to carry the supply required by Knockholt, but, on the other hand, the Company were of opinion that it was not large enough and that it would be necessary to make further provision, either another main or a means of boosting. This would entail further expenditure. He had also assumed that the cost of distribution and administration would not be more in respect of Knockholt than in the remainder of the South Suburban or Sevenoaks areas, and that was another factor in favour of Knockholt, or against the Company, in his estimates. The supply of gas in Knockholt by the South Suburban Company without the aid of a differential price would entail a decided loss. It was the proximity of the South Suburban Company's mains to Knockholt which made it possible to give a supply to that parish at all, and a supply could be given only if the differential of 2d. were permitted.

Cross-examined by Mr. Askew, Mr. Evetts said that the consumption he had estimated would not be realized at once in the Knockholt area. His estimate allowed for future developments in the sales per consumer, but not increased consumers.

Mr. ASKEW asked whether, if an exact analysis of costs of supply were made, it would be found that the cost of supplying would vary with almost each consumer.

Witness agreed.

COUNSEL pointed out that, in spite of this, a uniform charge was made for gas throughout practically the whole of the South Suburban Company's area of supply. Differential prices had been allowed in Greenhithe and Northfleet when those areas were added to the South Suburban Company's area, but were being reduced, and would finally disappear.

With regard to the statement by Sir Lynden Macassey, that the Sevenoaks Company had never supplied in Knockholt, although they could have charged up to 18·2d. per therm, Mr. Askew said he supposed the Sevenoaks Company would not be likely to sell at that price.

Witness said they would not sell in Knockholt at that price.

COUNSEL pointed out that in 1912 the South Suburban Gas Company had promoted a Bill in Parliament to extend their area of supply by including the areas of the Bromley and West Kent Gas Companies and a number of parishes which were not then within the area of supply of any gas undertaking. Among the latter were parishes within the Rural District of Bromley, and Knockholt was at first among those to be included in the South Suburban Company's area. It was discovered, however, that Knockholt was already within the area of the Sevenoaks Company, and for that reason the proposal to include it in the South Suburban Company's area was struck out of the Bill. He pointed out that if Knockholt had not been at that time within the Sevenoaks Company's district it would have been entitled to a supply of gas at the same price as the other parishes adjoining it, which were within the Rural District of Bromley and within the area of the South Metropolitan Company. Again, in 1912 there was a demand by the South Suburban Company for the right to charge differential prices in the various parishes perpetually, but there was opposition to that proposal, one of the opponents being the Bromley Rural District Council, with the result that it was decided to provide for the gradual diminution of the differential prices over a period of years until they disappeared—and, in fact, they had disappeared.

Sir LYNDEN MACASSEY said that the diminution of the differential prices was not a decision of Parliament, but was agreed upon by the parties concerned.

Witness expressed the opinion that the South Suburban Company had made a very grave mistake in agreeing to the elimination of the differential charges in these outer areas.

Mr. ASKEW pointed to the difficulties which would arise if the people in one of the thirteen parishes of the Rural District had to pay more for their gas than those in the other parishes within the Rural District.

Witness said he could foresee a much greater difficulty if the proposed differential were not permitted in Knockholt. The result would be that the price of gas there, if supplied, would be only 9½d., whereas in the urban district of Sevenoaks it would be 10½d. It would be absurd for the Gas Company to be compelled to sell at 9½d. in an area involving four times the capital expenditure involved in another in which 10½d. was charged.

Mr. Askew did not call evidence. Addressing the Committee on behalf of the Bromley Rural District Council, he emphasized that gas was a very important item in the domestic budget, more particularly in the smaller households. The position of Knockholt as regards gas supply was anomalous; the proposals in the Bill were unjust to the people there, and were not justified on the case placed before the Committee by the promoters. Indeed, the promoters had proved too much. If their arguments with regard to the methods by which the authorized prices of gas were to be determined were right, then the Acts of Parliament applying to the South Suburban Gas Company, and to numerous other companies, were wrong. The prime question was the policy of Parliament in fixing the price of gas. That policy had been not to allow a multiplicity of prices to different consumers, but to have uniformity over large areas. The South Suburban Company's existing area included parts of London, large suburban areas, industrial areas on the Thames, and very widespread rural areas; there were all sorts of factors affecting the cost of supply, and yet throughout practically the whole of that wide area there was one uniform price. In the Company's 1912 Act, when new areas were added to the area of supply, it was provided that the differential prices in those added areas should disappear, and they had disappeared; that policy was again carried out in regard to Northfleet, which was added to the Company's area in 1929. The South Suburban Company's area was not unique in respect of uniformity of price.

It had been stated by Mr. Evetts that there was a main extending over the borders of the existing area of the South Suburban Company into the parish of Knockholt, and it could be inferred that after the amalgamation gas would be supplied to Knockholt from the Bromley Works, in the Company's existing area. The passing of this Bill would mean that one small parish in the Rural District of Bromley would be paying a higher price for its gas than were the other parishes adjacent to it, and with which it had a community of interest. There was not the least doubt that, but for the fact that in 1912, when the other parishes were added to the South Suburban Company's area, Knockholt was found to be within the area of the Sevenoaks Company, it would at that time have been included in the South Suburban Company's area, and would by now have been entitled to the same provisions as to price as were the other parishes in that area. Knockholt seemed to have been a kind of Cinderella in this matter, and to have been pushed out in the cold. It had never been supplied by the Sevenoaks Company, although it had been within that Company's area since 1876, and it appeared that it was not likely to be supplied by that Company.

It had been admitted by Mr. Evetts that the cost of supply of gas in some areas would be greater than the average cost over the whole area of supply. Surely, if the price of gas in Knockholt were to be determined by such estimates as were put forward by Mr. Evetts, then the whole basis of the position of the South Suburban Company must be reviewed, because calculations of that kind could be made for any part of the area. It was not on those lines that the price of gas in a particular parish was to be determined by Parliament. If such had been the policy of Parliament, there would be twenty different parts of the Company's area subject to different prices. He submitted that the promoters had not satisfied the onus of proof that it was necessary to charge, in perpetuity, 11d. per 1000 c.ft. more in Knockholt than in the surrounding parishes. All the facts of the case led to the conclusion that it was right and proper that Knockholt should be included in the South Suburban price zone. None of the conclusions put forward had shown that the cost to the South Suburban Company of supplying gas in Knockholt was higher than that in neighbouring parishes.

Finally, Counsel asked that if the Committee were not with him in that, then he would ask them to say that at any rate a differential charge as high as 2d. per therm, in perpetuity, had not been justified by the case put forward.

After the luncheon interval, the Chairman announced the Committee's decision that the promoters had proved their case with regard to the differentiation of charge. They had come to this conclusion for two reasons; first, that there was no case for differentiating Knockholt from the rest of the Sevenoaks area, and, secondly, that no one was supplying gas in Knockholt, and if there were no differentiation of charge there would apparently be no inducement to anybody to supply gas there.

Imperial Continental Gas Association

ANNUAL MEETING

The One Hundred and Eighty-Fourth Ordinary General Meeting of the Imperial Continental Gas Association was held at the Great Eastern Hotel, London, on Wednesday, May 25, 1932, Sir HENRY BIRCHENOUGH, Bart., K.C.M.G. (Chairman of the Company), presiding.

The SECRETARY read the notice convening the meeting and also the Auditors' Certificate.

The Directors' Report and Accounts having been taken as read,

The CHAIRMAN said:

Ladies and Gentlemen,—

Before proceeding with the business which has brought us together to-day, you will, I am sure, wish me to give expression to our sense of the great loss the Association has incurred since our last General Meeting by the death of our then Chairman, Colonel Le Roy-Lewis. You will remember that Colonel Le Roy-Lewis was unable to be with us in May last year and that it was my privilege to read to you the admirable and comprehensive address he had prepared for our General Meeting. The hope we then entertained of his speedy recovery was, alas! doomed to disappointment and our Association has in consequence to mourn the loss of a singularly able and energetic chief. His whole heart was in the business and he never spared himself in the Company's service. He piloted the Company through the difficult process of transferring and delegating many of the Association's most important activities to Subsidiary Companies, and it is for us, ladies and gentlemen, to complete the work with which his name will always be associated. The choice of the Board has fallen upon me as his successor, and if you confer on me to-day the honour of re-election to the Board, you may rely upon me to do my utmost to discharge adequately the duties of the position of great trust to which I have succeeded.

The year covered by the Accounts before you has, generally speaking, been one of trade depression and declining profits, but I wish at once to dissipate any impression which may have been created in your minds by your first perusal of our Profit and Loss Account that the Association has not held its own during the past year. In order to substantiate what I say, I shall deal fully with the relevant figures in the course of my speech, and I am confident I shall be able to satisfy you that there has been no set-back in our case.

The total quantity of gas produced by the group of Companies in which we are interested was 280,000,000 cubic metres in 1931, a negligible increase of 0·4 per cent. For electricity the corresponding figures are 1,652,000,000 kilowatt-hours, a decrease of 3 per cent.

Although it is true that outputs have tended to decrease very slightly, the total trading profits for 1930-31 and 1931-32 are approximately the same. The reasons for this are comparatively simple. In periods of trade depression the natural tendency is for the output of industrial electricity and gas to drop. This industrial output represents the least remunerative part of our supply, since, in order to induce the industrialist to use gas or electricity, it is necessary to offer him tariffs which leave the supplying company a very small margin of profit. On the other hand, there is always a steady increase in the demand for electricity and gas for domestic purposes, owing to the natural growth of population, and this, representing the more remunerative part of our business, tends to maintain profits at the same level, notwithstanding the fall in total output.

The most marked event of the past year has, of course, been, for a Company like ours, the decision of the British Government to suspend the gold standard. Our Association is, in a sense, fortunate. The countries in which we operate have all remained on the gold standard and so our foreign earnings, but, of course, only in so far as they were available for remittance, produced a larger amount of sterling. I must remind you, however, that the Association has had in hand, mainly on behalf of its subsidiaries and Associated Companies, a large programme of extension and development for which, in the ordinary course of events, the requisite finance would be provided from London. I do not want you therefore to form any hasty inferences as to the effect of the decision to suspend the gold standard upon the Association's position. It is necessary to take into account the balance between remittances inwards and outwards. Between the 21st September, 1931 (when the gold standard was suspended and the rates of exchange broke), and the 31st March this year, the balance of actual remittances in favour of, that is towards, London from abroad, was only £169,000. You must always bear in mind that your Association is now almost entirely a Holding Company and that the operations in which it is interested are carried on by Subsidiary Companies. In many cases it has not been possible for us to obtain remittances to England of dividends and other payments, since it has been necessary to leave the amounts with Associated Companies, in order to enable them to meet their commitments.

In this connection I might just mention that the chief source of expenditure has been the Cokeries du Brabant, which has recently completed the erection of one of the largest and finest coke oven undertakings in Europe. The work of construction is now practically complete, and reflects considerable credit both upon the contractors responsible and, more particularly, upon Monsieur Coune, the Manager, under whose able supervision the Works have been erected.

The programme of development is now drawing to a close, and we trust that this year it will be possible to direct a fuller flow of remittances to London. At the same time, even with the stream of remittances homeward stimulated, I do not wish to arouse unjustifiable expectations in regard to next year. The present time is, markedly, an age of public utilities, that is an age of the performance of public services by public bodies or public companies, whether it be in the direction of heat, light, power, water or traction, and the demand for capital for extensions to meet increasing public requirements seems almost insatiable. If we are to develop your undertaking along sound lines and to secure for you the future to which you are entitled to look, we must be prepared to satisfy continuous calls for further investments in our progressive undertaking. In these circumstances your Board think that they would be ill-advised to enter upon a programme of dividend distribution the basis of which would be in a certain measure fortuitous, and even possibly illusory, I mean profits on exchange. Such profits on exchange should, we consider, be regarded rather as a windfall which may fructify in due course, but they should not at the present moment form an integral feature of the dividend policy of this Association. I hope in that you will agree. [Hear, hear.]

We have to recognise that the general European outlook is still very uncertain, and we have used, and shall continue to use, our influence with our Associated Companies to induce them to pursue a distinctly cautious policy in regard to the distribution of dividends, until such time as there is some definite improvement in the general industrial situation.

Let me pursue this subject of exchange a little further. The tendency in countries which have adhered to the gold standard is to effect a reduction of costs by a reduction in wage-rates and other elements of cost. Now the prices which our consumers pay for their gas and electricity are fixed by formulæ which vary in accordance with wage-rates and the price of coal. Reductions such as I have just referred to would therefore have the automatic effect of decreasing the prices which we are allowed to charge for gas and electricity. On the other hand, it is only fair to say that they would have *pro tanto* the compensating effect of reducing the cost of manufacure of the competitive articles which we are forced to produce, such as coke, sulphate, benzol, and tar and its various derivatives.

One other point before I leave the question of exchange. Our Belgian Companies had for the most part borrowed from us in sterling at the exchange rate of Frs. 175 to the £—prior to the date when the gold standard was suspended. In consequence, the burden of their collective indebtedness to the parent Companies was relieved as on the 31st December last by the fall in exchange to the extent of a total sum of 62,000,000 Belgian francs, which represents the difference between their debts at the old rate of exchange of Frs. 175 and the rate of exchange of Frs. 122 on the 31st December last. The rate is now Frs. 131. If the pound sterling were to rise, a further saving by the operating companies would naturally tend to disappear.

I reminded you a few minutes ago that the Imperial Continental Gas Association is now mainly a Holding Company, although we do in fact still operate ourselves directly a few comparatively small stations. In these circumstances we consider that our policy should be to encourage the Subsidiary and Associated Companies to build up internal Reserves of their own, so that they may eventually be in the position to stand upon their own feet. As an illustration I may mention that they have collectively during the year under review placed to Depreciation and Reserve sums equivalent to £302.000 as against £175.000 in the preceding year. You will see from this substantial increase that the conservative policy which has always constituted the strength of our Company is being steadily pursued by us.

I will go a step further and say that we hope that ultimately our Associated Companies may themselves be able to provide to a considerable extent for their own increasing financial requirements (and perhaps to repay us some of the advances we made them out of the new capital you have subscribed), by the issue of obligations or debentures in the local areas in which they operate.

At the present moment conditions are hardly favourable for making issues of debentures abroad, and in any case few of our Associated Companies have been established sufficiently long as independent undertakings to warrant their appealing to the local public.

The Compagnie Continentale du Gaz in France which is, however, a company of longer standing than the Belgian Companies, has already embarked upon this policy. In October last, before the present era of cheap money, it made an issue of Frs. 30,000,000 Debentures at a figure slightly under par at a rate of 5 per cent.—a rate which bore testimony at that time to the confidence with which it is regarded locally.

In the case of the Belgian Companies the opportunities for making issues are not solely dependent upon financial considerations, but upon programmes of reorganisations, and perhaps more particularly, *renewals of contracts*, which are receiving our constant consideration.

As I have just made use of the words "renewals of contracts," I do not think I shall find a better opportunity for giving you the highly encouraging and gratifying information that, as the

result of months of arduous negotiation, the Antwerp Company has just concluded satisfactory arrangements with the town of Antwerp for a renewal of rights for the supply and distribution of gas for a further period of thirty years. (Applause.) This Agreement, subject to its approval by the Government and the Provincial Council, will represent the continuance of an association which we highly cherish, as the Imperial Continental Gas Association has been responsible for the supply of gas in Antwerp since 1840, or for a period of 92 years. I imagine that very few British companies can show such a record as this, and if to the 92 years we add the prospect of a further 30 years, you have 122 years during which this Association or its successor has supplied this great City of Antwerp with gas. I feel proud, and I hope you will feel proud, of the conclusion of this supplementary contract. In view of our Association's very large interest in the Antwerp Gas Company, I think it would be not unfitting if this Meeting were to send a message of thanks to those who have been responsible at Antwerp for negotiating this important contract, and particularly to Monsieur De Wolf, who has shown remarkable skill in the conduct of the negotiations, and to Mr. Dadson, the acting Manager at Antwerp. I hope you will authorise me to do so. (Hear, hear.)

In connection with contracts with municipalities for the supply of gas or electric current, which I need hardly say are essential to the well-being and success of our undertaking, let me utter one word of warning. Such contracts in the case of gas give us a monopoly at an ascertained, if varying, price for gas, but you cannot produce gas without producing coke—there are times like the present when I wish one could. We have consequently to sell large quantities of metallurgical coke in a market in which we have no monopoly and where the price we get is purely competitive and is dependent upon the activity and prosperity or otherwise of the metallurgical industries. At the present time these industries are in a state of extreme depression. So far the difficulties in the way of marketing coke have not proved insuperable, but it has been necessary, and may remain for a time necessary, to sell part of the output at very low prices. This is *pro tanto* a handicap.

We have given you in the Report details of the operations of the Companies in which the Association is interested. I recommend you each year to examine those details carefully. I hope you will be able from year to year to observe for yourselves a steady development of their business and a progressive reinforcement of their Reserve positions—in other words, an increase of their assets and earning power—which should find expression in the Profit and Loss Account of the parent Company in the form of an increase in the dividends which find their way into your hands.

Looking to the immediate future—so far as our prospects are concerned, I see no reason whatever for depression—quite the contrary. We are all, whatever our interests may be—passing through a very critical period. We are surrounded by difficulties, which are beyond our control. It behoves us to be prudent and not to set our expectations unduly high; still, in my opinion, there is no obvious reason why our Association should not do at least as well in the year upon which we have entered as in the past year, with the accounts of which we are dealing to-day.

When it comes to dealing with the profits of an undertaking and making the consequential recommendations to stockholders, my personal view is that Directors should look at the interests of stockholders from two angles. From the point of view of dividend distribution, on the one hand, they should recommend as high a figure as prudence and even caution will sanction; and on the other hand, they should recommend or make such generous appropriations to Reserve as will progressively build up the assets of the Company and increase the capital value of each stockholder's holding. To this latter I attach special importance in these days of dwindling share quotations. (Hear, hear.)

This is the policy which the Board of the Imperial Continental Gas Association has always followed, with the result you saw in March last, when we were able to capitalise certain Reserves and make a free distribution of stock to our stockholders. I feel confident that you will support the maintenance of a policy which has led to such satisfactory results in the past.

Having made these general observations, ladies and gentlemen, I think it will now be most convenient and tend to clearness if I ask you to let me take you through the Balance Sheet and Profit and Loss Account. I can then give you such explanations as seem necessary and can show you by examples the application in practice of much that I have said in the earlier part of my speech.

On the Credit, the right-hand, side, the first item, Works and Mains, shows a reduction of £720,000. When we met you in March last, I warned you that certain of our Works were being put out of action and that the asset value of those Works in our Balance Sheet would have to be drastically written down. The necessary adjustments in our books have now been made and the asset on the one side, and in consequence the reserve held against it on the other side, both show this reduction of £720,000.

Although the greater part of our activities are now carried on through the Associated Companies, we still retain the direct ownership of these Works, mains and freehold properties, which stand in our books at £969,000. The net book value of these assets, after deducting the sums set aside under our reserves in respect of them, is, I can assure you, conservative and we do not foresee the necessity for making any further provision. We are now in course of clearing such parts of the Works sites as are no longer needed for our purposes, so that the surplus land may be sold.

Investments in Subsidiary and Allied Companies are this year shown separately from our General Investments. If you take together the total of our investments in Subsidiary Companies, the advances, our general investments and our cash and compare it with the corresponding total for last year, you will see that there is a difference of approximately £2,800,000, which represents the surplus disclosed upon the revaluation of our investments in Subsidiaries, which were capitalised as the result of the resolutions you passed in March last. Although the total remains approximately the same, there have been substantial changes in the individual items. For instance, more than half of our general investments have been sold and the proceeds have been reinvested either in our Associated Companies or turned into cash and held in the form of Treasury Bills in readiness for the payment of our this year's dividend.

On such realisations of our general investments as have taken place our total loss has been only £22,000. I think you will agree this is indeed a modest figure in a year when Stock Exchange values have been such as they have been. I should like to add for your information that the market value of our general investments at the 31st March showed a comfortable margin over the figure shown in the Balance Sheet.

The chief item which has swollen our investments in Subsidiary and Allied Companies is our investment of £540,000 in the Berlin Power and Light Company. This investment was made thirteen months ago, and although I do not say that it is an investment which we should necessarily make to-day, I think we shall have no real cause for regrets. The Berlin Company carries on the electricity supply of Berlin, which is a public utility business of the highest order. Our dividend is payable in gold. We have already received the dividend for the period ended the 30th June last, and I have every reason to believe that our dividends will continue to be paid to us regularly. This investment represents, of course, a very substantial sum of money, but I think it desirable to caution you against overestimating the proportion which it bears to our total assets.

The shrinkage which you will observe in Advances to Subsidiary and Allied Companies is due to the fact that part of our advances has been capitalised and our loans converted into shares. As I have already told you, we trust that our Associated Companies will in due course be able to make issues of Debentures to the public, and to repay a considerable part of these advances.

On the Debit, the left-hand, side of the Balance Sheet, the first item is the Capital of the Association, which has been increased by £2,800,000 through the recent bonus issue arising out of the revaluation of the Investments.

Sundry Creditors and Provisions, which may appear to some of you to be rather high, cover our pension and taxation equalisation Reserves.

I have already explained that the reduction in our Reserves is due to the writing down of our Works and Mains.

In accordance with the policy fully explained to you at the last Annual General Meeting, we do not propose to make any addition to the Reserves of the parent Company this year. As was then pointed out, no relief can be obtained from English taxation in respect of sums set aside for depreciation of plant and machinery which has been ceded to our Subsidiaries and which formed a substantial portion of our fixed assets in the old days. In consequence, any sums now placed to reserve by the parent Company would be taxed here at the full rate, after suffering the taxation imposed by the country from which the profits originate. If, for example, we were to bring our total profits from Belgium, the total tax borne, British and Belgian, would amount to 8s. 8d. in the £, and if from France 9s. 8d. in the £. These are appalling figures. If, on the other hand, our Subsidiaries themselves create reserves to cover depreciation and for the amortisation of their leasehold concessions, no British taxation liability arises upon them.

In the case of a Company like our own, which is among the worst sufferers from double taxation, one begins to wonder whether, in view of the above figures, a breaking point has not almost been reached, and whether, unless steps are taken in this country to alleviate the heavy burdens which fall upon companies the greater part of whose profits are earned in foreign countries, it may become necessary to take into consideration the sale of part of our interests to foreign groups. It would be premature for us to contemplate this possibility to-day, and I may just say that I should regard the de-nationalisation of our century-old Associations as almost a tragedy. Some extension of the system of Dominion Income Tax relief to profits earned in foreign countries is, in my opinion, imperative if British enterprise is to receive adequate inducement to engage in foreign business. It is obvious that in default of an international agreement providing for reciprocal relief, little is likely to be done, but I should like to emphasise the definite though indirect advantages which accrue to British trade through undertakings like this Association having their registered seat in this country.

If you will turn to the Profit and Loss Account at the foot of the Balance Sheet, you will see that our total revenue for the year amounts to £702,000 as against £732,000 last year. In face of these figures you will expect me to justify my assertion that the Association has held its own during the year under review. The drop, ladies and gentlemen, is more apparent than real, for you would arrive at a very incomplete picture of our total trading if you regard only the profits of the parent Company without taking into consideration the sums placed to reserve by our Associated Companies. The total profits of our Group of undertakings, taking only the proportion which our holdings bear to their total capital—because we do not own the

whole of the capital in our Companies—were, before providing for reserves or taxation, whether English or foreign, at the rate of exchange ruling on the 31st March last, £127,000 more than the previous year. You will therefore see that there has been an increase and not a decrease, though we must recognise that a considerable part of the increase is due to exchange profit.

On the Debit side of the Profit and Loss Account, Administration and General Expenses show an increase of £20,000. This increase is entirely due to the increase in the rate of British Income Tax. In consequence, £20,000 more has been contributed by us to Government services in this country and £20,000 less is available for reinvestment in our business. So long as Governments continue to divert such vast sums, as they do, from potential and actual savings for the purpose of current public expenditure, the natural expansion of progressive private enterprise is *pro tanto* diminished even if it is not altogether arrested. We live in a vicious circle; excessive taxation diminishes employment, and further taxation then becomes necessary for the maintenance of the unemployed. A more vicious circle it is difficult to imagine.

With the Carry Forward from last year we have a sum of £939,368 to appropriate. Out of this an Interim Dividend of 7½ per cent., less tax, on the capital of £2,800,000 was paid on the 13th November last, absorbing £157,500, and we now recommend the payment of a Final Dividend of 7 per cent., less tax, on the increased capital of £5,600,000, which will absorb £294,000, and a proportionate bonus to our staff of £4,515, leaving as Carry Forward to next year £483,853, an amount which, with the present rate of income tax, is equivalent to carrying forward a Dividend of 11½ per cent. on our increased capital.

Before putting the motion, there remains to me a duty which is also a great pleasure, that is to express the warm appreciation of the Board and Stockholders of the services of the various staffs abroad and in London during the past year. Our Association has a great tradition of service. Our staffs at home and abroad have always been a body of comrades united in their devotion and loyalty to the great Association they serve. This comradeship of men and women serving in different countries is a spirit I hope we shall always cherish in the future as in the past, for it has an incalculable value. We necessarily depend upon our staff to defend and extend our interests and to maintain our prestige. Here in London we can only deal in the main with questions of policy. It is for the staffs at home and abroad to carry them out, and this they do, in our opinion, with unfailing loyalty. If you approve of these few words we will send them in your name a message of warm appreciation and encouragement. (Hear, hear, and applause.)

I now move:—That the Report of the Directors and the audited Statement of Accounts for the twelve months ended the 31st March, 1932, already printed and circulated amongst the Proprietors and now read, be adopted, and that a Final Ordinary Dividend on the £5,600,000 Capital Stock be paid on the 27th May, 1932, for the year ended the 31st March, 1932, to Proprietors registered in the books at the close of business on the 9th May, 1932, at the rate of 7 per cent. (actual), less Income Tax, making, with the Interim Dividend of 7½ per cent. (actual), less Income Tax, paid on the 12th November, 1931, a dividend equivalent to the rate of 10¾ per cent., less Tax, for the year upon the doubled capital.

Sir GUY FLEETWOOD WILSON: I beg to second the motion.

The CHAIRMAN: If any stockholders would care to make any comments, we shall be pleased to hear them, and I will do my best to answer any questions they may put.

Mr. L. E. PEPPIATT: I am sure we have all listened with great interest to the Chairman's speech, and particularly to what he has said about the increased profits of the subsidiary companies. We appreciate fully the wisdom and prudence of the policy of the Board in strengthening the reserves of the subsidiary companies, and we appreciate what the Chairman has been good enough to say to us with regard to the question of taxation and the importance of seeing that too much money should not be sent to this country and bear double taxation if it has to go back again. The Chairman has been good enough to explain that that is one of the reasons why the reserves in the subsidiary companies have been increased, another reason being that the Board desires to see the subsidiary companies in the position of being able to finance their own extensions without calling on the parent Company. If I may be allowed to say so, that seems to me a prudent and proper procedure which the Proprietors will endorse. But having arrived at that conclusion, and having made provision for these reserves, you then bring back a balance to this country, which suffers from British taxation and has already suffered from foreign taxation. Having done that, it does not seem fair to me and to the proprietors whom I represent, that that amount should not be distributed in dividends to the proprietors. I refer to the increase in the carry forward of £46,000, which is equal, approximately, to 1 per cent. on the issued capital of the Association. Therefore, I should like to ask for some explanation of why it was necessary to increase the carry forward by that considerable amount, and not to make that amount available for increased dividends for the benefit of the proprietors.

Another Stockholder asked if he could be given the percentages of revenue which arose from sales of gas and electricity for domestic purposes and for industrial purposes, and was told that, although the information was not available at the meeting, he would be welcomed at the office, when the necessary particulars could be supplied to him.

Mr. H. C. ARNOLD-FORSTER raised the question of the form in which the accounts of the Subsidiary Companies were presented, and said that the information given was supplied in such a way that comparison with the previous year's figures was impossible.

He considered that it was necessary for the facts to be presented in the accounts rather than in the Chairman's speech.

He took exception to the expression, "distributable profit," which, he held, bore different meanings in the case of the different companies, and did not tell the stockholders whether the associated companies had done better or worse than in the previous year.

The Chairman had given them a great deal of encouragement, since they now knew that the profits had been increased, but there was nothing in the report to show that at all.

He expressed the hope that fuller information would be given to the stockholders in the accounts next year, so as to enable them to make some valuation of their investment in the Association.

Mr. G. ANSLEY congratulated the Board upon the excellent results achieved, and agreed with the previous speaker in asking that additional information should be supplied in regard to the activities of the associated companies. Mr. Ansley said that it was known that the policy of the Board had been persistently to under-value the assets of the Association, and that it was essential that such information should be given to stockholders as would enable them to form some assessment of the valuation of their holdings. He appreciated that the Board were anxious to take the stockholders into their confidence as far as was possible, having regard to the general interests of the Company.

The CHAIRMAN: I will do my best to answer the points that have been raised. With regard to the first question, as to why we have not distributed more dividend, you may think we have been very cautious; you may even think we have been slightly over-cautious; but on the whole it is better to be cautious than imprudent. It is quite true that we could have paid an extra 1 per cent. at the end of the year, but when I had the honour of addressing you in March in connection with the issue of the bonus stock, I said I thought we should be able to pay 7 per cent. on the double stock, and we have purposely kept to that figure. Times are so difficult that we thought it was far better to keep that £46,000 in our coffers than to distribute it. The success of the 108 years' existence of this Association has been due to cautious management, and on the whole I think the stockholders have done fairly well out of it.

With regard to what Mr. Arnold-Forster has said—and may I compliment him upon his admirable speech?—I am personally delighted that he should show so much interest in the Accounts. I am anxious that shareholders should examine statements relating to the subsidiary companies with close attention, and I am very gratified that Mr. Arnold-Forster should have spoken as he has. I daresay many of you read in the *Times* City Notes this morning the short article upon the statements of accounts of holding companies with regard to their subsidiaries. That gave me something to reflect upon, and we shall certainly consult our accountants and solicitors as to how far we can go in reorganising our statement of accounts. (Hear, hear.)

I daresay that we have erred on the side of reticence, but after the expressions of opinion that have been made to-day and the manner in which they have been received by stockholders, I think I can say that we will give fuller information next year. (Hear, hear.) The Company is in a strong position. It has been very prudently conducted and there is absolutely nothing to conceal; but I do hope that you will appreciate that times are so extraordinarily difficult that you must forgive your Directors if they err on the side of extreme caution. A supply business such as ours is always in need of money, because we must, under contract, meet the increasing demands of the public, and, therefore, we have to keep larger sums in reserve than other companies, unless we are prepared to come to you for fresh money, and we do not want to do that more than is necessary. However, a word to the wise. You have expressed your views, and we will see what we can do next year. I also thank Mr. Ansley for his expression of confidence in the Board, but, if he will allow me to say so, those thanks should be extended to the staff, who undoubtedly deserve the thanks of the stockholders. We have passed through difficult times, but the Company is in an extraordinarily sound position. Everything that has been suggested has been noted, and we shall take to heart all that has been said. It has been suggested that our stock has fallen. I am not sure it has fallen since the issue of the Report. I do not pretend to know more than anybody else, but it has been suggested to me that some of our holders, who had their holdings doubled, sold some of their stock to meet other commitments, and that would produce a falling market. That may be one of the reasons. I should be sorry to think that our stock has fallen in the ordinary way because of any lack of confidence, I do not say in the Board, but in the undertaking. May I say again that we will give careful consideration to all that has been said, and I think I can promise that next year we shall give you the fullest information consistent with your interests.

The Report and Accounts were then unanimously adopted.

Sir GUY FLEETWOOD WILSON: I desire to move that Sir Henry Birchenough, Bart., K.C.M.G., who retires by rotation, be re-elected a Director of the Association.

Mr. H. G. PALMER: I beg to second that.

The motion was carried unanimously.

The CHAIRMAN: We have to propose the re-election of one Director and confirm the election of three others. I propose the re-election of Mr. S. H. Le Roy-Lewis and the confirmation of

the election of Mr. Frank Henry James, M. Georges Theunis, G.C.M.G., and Sir John Robert Chancellor, G.C.M.G., G.C.V.O., who retire, having been added to the Board since the last annual general meeting. Mr. James you all know; M. Theunis is a very distinguished ex-Prime Minister of Belgium; and Sir John Chancellor is a man of immense experience, and has already shown a deep interest in our affairs. Mr. Le Roy-Lewis has been a Director for some time.

Sir GEORGE JESSEL: I have much pleasure in seconding the motion.

The resolution was carried unanimously.

Mr. J. E. LLOYD (a proprietor): I beg to move:

"That the firm of Messrs. George A. Touche and Company, of Basildon House, 7-11, Moorgate, London, Chartered Accountants, be appointed Auditors for the ensuing year, at a fee of 250 guineas."

Mr. A. C. WHITMEE (a proprietor): I beg to second that.

The resolution was carried unanimously.

Mr. BERNARD HENNELL: Before we part, I am sure you would like to pass a vote of thanks to the Chairman for presiding at the meeting this afternoon, coupled with thanks to the Directorate for the manner in which they have watched our interests during the past year. I appreciate what the Chairman has said with regard to giving us fuller information at the end of the year, because I know the same problem is being felt by a number of Chairmen of companies and subsidiaries; but I know we shall all welcome further information if it can be given to us. I propose a hearty vote of thanks to the Chairman and the Board.

The motion was seconded and carried with acclamation.

The CHAIRMAN briefly acknowledged the vote of thanks and the proceedings closed.

Whessoe Foundry and Engineering Co., Ltd.

The 12th Annual General Meeting of the Whessoe Foundry and Engineering Company, Ltd., was held at 25, Victoria Street, London, on June 7—Mr. HAROLD G. JUDD, the Chairman of the Company, presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said: The Directors' Report and Accounts have been in your hands for some days, and I assume I may take them as read. (Agreed.)

It will not be a matter of surprise to you that our accounts reflect the abnormal and extremely difficult times which every industry, and in particular the engineering trade, has experienced during the year. When we met a year ago the prospects then were not bright, but the actual experience of the year has been even worse than could have been foreseen, and manufacturing, particularly in the constructional industries, has been at the lowest ebb known for many years. In common with other constructional firms, our Company has suffered from restricted demand and consequent competition of ever-increasing intensity. As a result our output in all departments has been restricted, and the diminution has been particularly severe in our export trade which in the past has contributed a substantial portion of our turnover. For instance, I may mention that our largest item of manufacture—viz., oil tanks—has suffered seriously through the drastic reduction of construction programmes in the oil industry due to world conditions which are well known.

A POLICY OF DEVELOPMENT.

As mentioned in previous reports, your Board have for some time followed a steady policy of development into other lines of manufacture; some of these hold promise of additional outlets for our works, while others are still in course of development. Under this policy we have secured the manufacturing rights of certain specialities which we trust will prove profitable.

The leanness of the market—far from reducing the burden of administrative work—has necessitated the most strenuous endeavour on the part of the management and the staff in order to secure the utmost possible amount of orders, and numerous avenues of investigation have been and are being closely followed up.

In view of the conditions I have described, your Directors regard it as not unsatisfactory that the trading profit earned has amounted to the figure of £5463 shown in the accounts, although this represents a substantial diminution compared with previous years.

We have thought it right to bring into profits this year certain internal reserves which had previously been set aside for taxation and other purposes, which reserves are no longer required. It is perhaps fair to add that this transfer does not exhaust those internal reserves, and you will appreciate that there remains intact the general reserve of £40,000 which appears in the balance-sheet and is covered by gilt-edged investments. We have also brought into profits a sum of £939, being the profit realized upon the sale of certain securities.

I may add that the present market value of our investments exceeds by several thousand pounds the figure standing in the balance-sheet.

THE SUBSIDIARY COMPANY.

Our Subsidiary Company I am glad to say continues to earn a small profit; our investment in that Company is more than covered by assets and no credit in respect of that profit has been brought into the accounts.

The works and plant have been maintained in excellent condition out of revenue, and full depreciation has also been written off. The other assets are conservatively valued and indicate the strong financial position of the Company.

The sum available for distribution, including the balance brought in from the previous year, amounts to £17,554, out of which we recommend the payment of a dividend of 7½ p.ct. (less tax), requiring £11,250, and leaving a carry-forward of £6304. While this carry-forward is lower than last year, it is practically the same amount as two years ago.

In conclusion, I should like to express the Board's appreciation of the loyal and energetic manner in which the management and staff have worked during this time of exceptional difficulty.

I now formally move the adoption of the Directors' report and the accounts for the year to March 31, 1932, and the payment of a dividend at the rate of 7½ p.ct., less income-tax.

The resolution was unanimously passed, and the retiring Director (Mr. C. M. Spielman) was re-elected, and the Auditors (Messrs. Peat, Marwick, Mitchell, & Co.) were re-appointed.

PARLIAMENTARY INTELLIGENCE

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Commercial Gas Bill and the South Suburban Gas Bill have been brought from the Commons, read a first time, and referred to the Examiners.

The Oakham Gas and Electricity Bill has been read a second time and committed.

The opposition to the South Metropolitan Gas Bill having been withdrawn, the Bill has been committed. The Unopposed Bills Committee considered this Bill and the Kettering Gas Bill on June 2.

Special Order.

The South Yorkshire and Derbyshire Gas Order was considered by the Special Orders Committee on June 2.

House of Commons.

Private Bills.

The Commercial Gas Bill, the South Suburban Gas Bill, and the Mid-Southern Utility Bill have been considered, as amended, read a third time, and passed.

The Lords' amendments to the Scarborough Gas Bill have been considered and agreed to.

Gas Undertakings Bill.

The Bill has been read a second time without debate and referred to a Standing Committee.

Prohibition of Gas.

Mr. HUTCHISON asked the Minister of Health if he would state the number and names of Urban District Councils in Essex which imposed on their tenants a condition that they must either discontinue the use of gas in favour of electricity or run the risk of being ejected from their homes; and whether his Department discouraged this practice, in view of the fact that these houses were constructed in part with public money.

Sir HILTON YOUNG regretted that the information sought was not available as local authorities were not required to inform him of their methods of management of their estates. He had no reason to suppose that such a practice was common, and if consulted on the matter, he should certainly deprecate arbitrary action of the kind described.

REGISTER OF PATENTS

Gas-Fired Re-Heating Furnaces.—No. 361,551.

PRIEST, C F., of Middlesbrough.

No. 32,051; Oct. 24, 1930.

This invention relates to gas-fired reheating furnaces, more particularly sheet mill furnaces for the treatment of steel and other material, and wherein it is necessary to provide a reducing atmosphere within the heating chamber.

The object is to provide a furnace which will provide the desirable reducing atmosphere within the furnace, but wherein the unconsumed fuel components are further treated whereby the exhaust to atmosphere will be free from smoke and other solid particles. Further, this subsequent treatment may be utilized to increase the efficiency of the furnace.

A furnace is provided wherein a primary air and gas mixture is combusted beneath the furnace hearth, the products of combustion passing thence to the heating chamber of the furnace, being provided during their passage with a further supply of gas to provide the necessary reducing atmosphere within the heating chamber. The partially consumed products of combustion are then passed from the heating chamber and provided with a supply of secondary air, whereby the complete combustion of the smoky mixture is effected, the hot gases being used to preheat the primary and/or secondary air before finally passing to atmosphere.

The complete combustion of the fuel components is effected in three stages; first, a primary air and gas mixture is combusted outside the heating chamber; secondly, a supplementary supply of fuel gas is added to the mixture prior to its entry into the heating chamber to provide the necessary reducing atmosphere; and thirdly, the imperfectly combusted mixture from the heating chamber is provided with a supply of secondary air whereby combustion is completed.

Storage Water Heaters.—No. 366,003.

LAMBERT, A. J., and WHITE TILE HEATERS, LTD., both of York.

No. 27,690; Sept. 16, 1930.

The heater is of the kind which comprises a container having an inlet for liquid which is stored and heated in the container and which overflows, or is forced, into a supply pipe. A difficulty encountered in heaters of this kind, state the patentees, is that when the temperature of the liquid stored in the container rises the level of the liquid also rises. This increase in volume causes the liquid to trickle into the supply pipe. An object of this invention is to overcome this difficulty. The invention accordingly provides in combination with a heater of the kind described, means for limiting the level of liquid in the container, which means operates with a syphoning action to give a supply of liquid.

Among the claims are:

In a storage water heater of the kind described, a casing adapted to be detachably secured on the container to constitute a sunken portion thereon and to receive the heating gases, and a heating chamber or chambers mounted on the casing so as to be "wiped" by the hot gases, the outlet or outlets from the chamber or chambers being located at least 40 p.ct. of the total depth of water below the normal level of water stored in the container.

A heater wherein the walls of the chamber or chambers are corrugated.

A heater wherein the casing is formed with a peripheral lip.

A heater wherein an auxiliary chamber filled by overflow from the container and a syphoning device which gives a delivery of liquid from the auxiliary chamber are mounted on the casing so as to be detachable therewith.

A heater including a thermostatic device.

Attaching Meter Diaphragms.—No. 365,410.

COOKE, A. G., of Hove.

No. 9158; March 25, 1931.

According to this invention the means for securing the flexible diaphragm to a rim in a dry gas meter comprises a closely coiled helical spring mounted over the diaphragm and rim, and is characterized in that one end of the spring is reduced and is screwed into the opposite end, thus forming an endless band which cannot come apart when the spring is under tension and forming a gastight joint around the rim and diaphragm, especially at the joint of the spring.

The reduced end of the spring is so coiled that when the opposite ends of the spring are screwed together the coils increase in diameter so as to form an endless band in which the coils are all of the same diameter.

Counters for Gas Meters.—No. 366,582.

UNITED GAS INDUSTRIES, LTD., of Lincoln's Inn Fields, W.C. 2, and CHARLES, A., of Streatham Vale, S.W. 16.

No. 33,456; Nov. 7, 1930.

The invention aims at avoiding locking or difficulty of movement by reason of infrequent movement of the elements of the mechanism. The respective spindles of a direct reading index counter mechanism are geared together to rotate at each operation of the driving or actuating element. This may be done by mounting inter-engaging toothed pinions upon adjacent ends of the parallel disposed spindles respectively of the number wheels and of the pinions, by means of which movement is imparted from one number wheel to that next adjacent it on each complete rotation of the respective number wheels, so that at each rotation of the driving or actuating element, each of the spindles so geared together are moved. Thus all the pinions by which movement is imparted from one number wheel to that next adjacent are loosely mounted upon their spindle, and the units wheel and the element or elements by which movement is imparted to the units wheel are fixedly mounted upon the number wheels spindle, or with respect to it.

Gas Drying.—No. 366,646.

WATSON, S. G., of Surbiton, HENSHAW, D. M., and W. C. HOLMES & CO., LTD., both of Huddersfield.

No. 36,774; Dec. 5, 1930.

The object of this invention is to reduce back-pressure in rotary brush washers and to enable the operation of gas drying or naphthalene removal to be carried out with a minimum of attention. In regard to the apparatus used for securing contact between the gas and hygroscopic medium, the filling material within the apparatus and other working parts in general shall be more easily accessible for inspection, cleaning, and adjustment.

The process in accordance with the invention may comprise also treating the water-absorbing material in the liquid state continuously or intermittently to effect the removal of the water which it has taken up from the gas, and, optionally, also to cooling, which may be to a degree merely sufficient to remove the heat evolved by the absorption of the water from the gas or sufficient to promote the separation of water by lowering the temperature of the gas with which it is brought into contact.

The characteristic feature of apparatus in accordance with the invention is the provision of a single pump or the like for the circulation of the water-absorbing bodies in the liquid state through all of the compartments, in association with means whereby the proportion of water-absorbing bodies in the liquid state delivered by the pump to the several compartments may differ, a large proportion—say, one half—of the total quantity being supplied to the compartment into which the gas is first introduced, the remaining proportion being divided equally or unequally between the remaining compartments.

Intermittent Chambers.—No. 366,656.

GAS CHAMBERS AND COKE OVENS, LTD., BOWATER, N. J., and LYMN, A. H., all of Westminster, S.W. 1.

No. 37,747; Dec. 15, 1930.

This invention contemplates the provision on intermittently operating carbonizing chambers or retorts of both top and bottom gas offtakes communicating with a common foul gas main. The top gas offtakes may be provided with a liquid seal of the customary type, which seal can be removed entirely when gas is being evolved, while the bottom gas offtakes communicating with the bottom of the chamber, where, in the absence of an offtake, pressure may accumulate when carbonizing certain coals, may be fitted with an adjustable valve or cup containing liquid, the seal imposed by the liquid being adjustable by altering the position of the valve or cup relative to the gas off-take, or with other means adapted to vary a liquid seal. Thus during the period of maximum gas evolution or maximum pressure in the bottom of the chamber or retort, the seal imposed on the gas offtake can be reduced or removed by lowering the valve or cup away from the bottom of the offtake; while during the period of minimum gas evolution the requisite pressure in the chambers or retorts is obtained by raising the valve or cup to the necessary extent.

Between these stages of gas evolution, the extent to which the off-take is sealed may be adjusted by gradually increasing the seal as the volume of gas evolved decreases, and the operation of adjusting the depth of the seal may be carried out by hand or by an automatic device.

Complete Gasification.—No. 366,782.

HUMPHREYS & GLASGOW, LTD., and GRIGGS, A. R., both of Westminster, S.W. 1.

No. 8848; March 23, 1931.

This invention is concerned with a complete gasification process wherein steam superheated in the recuperative chamber or chambers and then passed through the fuel bed in countercurrent direction with reference to the travel of the fuel is first caused to pass through an injector which is embodied in or constitutes part of an independent connection between the top of the carbonization chamber, or the gas off-take therefrom, and one of the recuperative chambers, or the gas offtake therefrom, whereby sufficient circulation of gas is obtained to ensure the complete and efficient carbonization of the coal with no more steam than is normally required for the gas making phase during which re-circulation of the gas can be carried out.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see later pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. June 3.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Apl. 4	7⅞	7⅞	Alliance & Dublin Ord. ...	101—106	+1	104—105½
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
567,655	,,	Mar. 14	7	7	Barnet Ord. 7 p.c.	127—132	...	128—130½
300,000	1	Apl. 29	1/4½	1/9⅜	Bombay, Ltd.	15/—20/-	...	17/—17/6
177,780	10	Feb. 29	9	9	Bournemouth 5 p.c. ...	16½—17½	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12⅞—13½	...	13⅛—13⅝
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11½—12½	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	62—67	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	83—88	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	105—108	...	107⅜—108
357,900	,,	Mar. 14	7½	7½	Brighton, Hove, & Worthing 6 p.c. Con. ...	122—127	...	127½
540,000	,,	,,	6⅝	6⅝	Do. 5 p.c. Con. ...	109—114	...	113½
195,500	,,	,,	6	6	Do. 6 p.c. B Pref.	114—119	...	...
1,287,500	,,	Feb. 29	5	5	Bristol 5 p.c. max.	98—100a	+1	...
120,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	85—87a	+1½	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	85—87a	+1½	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	100—102a	+1	...
855,000	,,	Apl. 4	7	8	British Ord.	113—118	...	116—116½
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	115—120	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	77—83	...	81
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...	...
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	100—105	...	...
100,000	10	May 23	6	6	Cape Town, Ltd.	7½—8½*	...	7¼
100,000	10	Apl. 29	4½	4½	Do. 4½ p.c. Pref. ...	6—7	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	76—81	...	...
636,860	,,	Feb. 15	6	6	Cardiff Con. Ord.	101—105	...	...
237,860	,,	Jan. 4	2⅝	5	Do. 5 p.c. Red. Deb.	97—102	...	...
157,150	,,	Feb. 15	5	6½	Chester 5 p.c. Ord.	87—92b	...	...
98,936	1	May 23	2/-	2/-	Colombo, Ltd. Ord....	26/—31/.*	...	...
24,500	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	17/—19/-*	...	...
609,204	1	Apl. 4	-/10'90	-/11'47	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/2'54	1/3'30	Do. 8 p.c. Pref.	10/—15/-	...	...
2,078,380	Stk.	Feb. 15	6	6⅝	Commercial Ord.	96—99	...	97½—98½
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	61—64	...	...
807,560	,,	Feb. 15	7	7	Croydon sliding scale ...	118—123	...	121½—122½
469,590	,,	,,	5	5	Do. max. div.	82—87	...	...
500,000	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	102—107	+2	103
542,270	,,	Feb. 29	7	10	Derby Con.	117—122c	...	...
55,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	65—70c	...	...
209,000	,,	Mar. 14	5	5	East Hull Ord. 5 p.c. ...	75—80	...	...
179,500	,,	Feb. 29	5½	5½	East Surrey Ord. 5 p.c.	93—98	...	...
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	97—102	...	...
1,002,180	,,	Mar. 14	†4	†6½	European, Ltd.	85—95	−5	88—95
19,405,992	,,	Feb. 15	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	20/6—21/6/	−/3	20/9—21/1½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	65—69	...	...
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	83—87	...	85½—87½
6,102,497	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	66—69	...	67—68
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	104—107	...	105⅛—107
2,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	101—104	+1	100½—109½
162,280	,,	Feb. 29	10	10	Harrogate Cons. 10 p.c. max.	...	...	...
82,500	,,	Mar. 14	7	7	Hastings & St. L. 5 p.c. Conv.	103—108	...	...
258,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	82—87	...	...
70,000	10	9 Oct. '30	½	10	Hongkong & China, Ltd. ...	11—12	...	...
213,200	Stk.	Feb. 29	6	6	Hornsey Con. 3½ p.c. ...	87—90	...	...
5,600,000	,,	Oct. 30	25	15	Imperial Continental Cap.	150—160	−12½	151½—167
223,130	,,	Feb. 1	3½	3½	Do. 3½ p.c. Red. Deb.	72—77	...	...
285,242	,,	Mar. 14	8½	8½	Lea Bridge 5 p.c. Ord. ...	134—139	...	135
2,145,907	,,	Feb. 29	6	6	Liverpool 5 p.c. Ord. ...	106—107b	−¼	...
245,500	,,	—	—	5	Do. 5 p.c. Red. Pref. ...	97—102b	...	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	85—90b	...	...
165,736	,,	Feb. 15	8	10	Maidstone 5 p.c. Cap. ...	124—129	...	...
56,176	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	57—62	...	...
75,000	5	Nov. 30	†10	†10	Malta & Mediterranean ...	7—8	...	8
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	80—85	...	81
171,978	Stk.	Feb. 29	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	76—81	...	80—80¼
112,126	,,	g	4	4	Do. 4 p.c. Deb. ...	78—83	...	...
148,955	,,	g	5	5	Do. 5 p.c. Deb. ...	100—105	...	...
675,000	,,	31 May '31	16	16	Montevideo, Ltd.	50—70	...	...
2,061,515	,,	Feb. 29	5	5½	Newcastle & Gateshead Con.	18/9—19/9d/	−/3	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	78—80d	...	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	74—76d	+4	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Deb. '43...	99—101d	...	...
199,940	,,	Mar. 14	7½	7½	North Middlesex 5 p.c. Con.	118—123	...	...
396,160	,,	Feb. 15	5	5	Northampton 5 p.c. max. ...	78—83	...	...
300,000	,,	Apl. 18	9	7	Oriental, Ltd.	85—95	...	...
205,152	,,	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	127—132	...	...
504,416	,,	Feb. 15	8	8	Portsm'th Con.Stk. 4 p.c.Std.	126—131	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—83	...	...
114,000	,,	Feb. 15	5	5	Preston 5 p.c. Pref.	94—99	...	...
686,812	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	...	...
389,813	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	...
150,000	10	Apl. 4	6	6	San Paulo 6 p.c. Pref. ...	7—7½	...	...
1,736,968	Stk.	Apl. 4	6	6	Sheffield Cons.	101—103d	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81e	...	...
133,201	,,	Feb. 29	8½	5	Shrewsbury 5 p.c. Ord. ...	99—104	...	99½—100½
99,000	10	June 11	15	15	South African	3—5	...	...
6,709,895	Stk.	Feb. 15	5	7	South Met. Ord.	104—107	...	105½—107
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	115—120	...	118½—119½
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	65—69	...	68—69
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	102—105	...	105½
91,500	,,	Feb. 29	8½	8½	South Shields Con.	129—131d	...	...
1,943,795	,,	Feb. 15	6½	6	South Suburban Ord. 5 p.c.	102—107	...	105⅛—106⅜
300,000	,,	,,	5	5	Do. 5 p.c. Pref.	97—102	...	...
668,837	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	102—107	...	105⅛—106
647,740	,,	Feb. 29	5	5	Southampt'n Ord. 5 p.c. max.	79—84	...	...
121,375	,,	,,	4	4	Do. 4 p.c. Deb.	77—82	...	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	98—102	...	...
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	...
1,076,490	,,	Feb. 29	6⅝	6⅝	Tottenham and District Ord.	105—115	+1½	115
300,000	,,	,,	5¼	5¼	Do. 5¼ p.c. Pref. ...	102—107	...	104
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb.	77—82	...	...
85,701	,,	Apl. 4	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	70—75	...	...
346,069	,,	Feb. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c. ...	108—113	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	95—100	...	...
1,323,220	,,	Feb. 29	7	7	Wandsworth and District: Consolidated	120—125	+3	120—123½
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	98—103	...	101½—102½
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	103—106	...	105½
158,400	,,	Feb. 29	5	6h	Winchester W.&G.5p.c.Con.	85—90	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. *h* Paid £3, including 10s. on account of back dividends. *Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

STOCK ISSUES.

By Order of the Directors.

THE RUGBY GAS COMPANY.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

£25,570

5½ PER CENT. PREFERENCE STOCK.

Minimum Price of Issue, Par.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Tuesday, the 14th of June) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

By Order of the Directors.

WESTON-SUPER-MARE GASLIGHT COMPANY.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

£2000

FIVE PER CENT. IRREDEEMABLE DEBENTURE STOCK.

Minimum Price of Issue, £105 per £100.

Yielding at that Price, £4 15s. 3d. per cent. Also

£14,380

FIVE PER CENT. IRREDEEMABLE PREFERENCE STOCK.

Minimum Price of Issue, £97 per £100.

Yielding at that Price, £5 3s. 1d. per cent.

Prospectus and Forms of Tender (which latter must be sent in by 11 o'clock on Thursday, the 23rd of June) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

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1931.

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see earlier page.]

Business on the Stock Exchange last week was irregular. The several new international developments played a large part both for and against a revival of confidence, as all tended to have some financial reaction. The resignation of the German Cabinet caused a partial set-back in British Government securities, though these eventually recovered on the news that the United States Senate had passed the Revenue Bill. A further stimulus was the announcement that America had accepted an invitation to attend in London a world economic conference. The week ended on a more optimistic note, and British Funds generally closed a fraction higher than the previous week.

Gas stocks and shares continued a firm market, and in many cases business was done at prices slightly higher than those of the previous week. There were no spectacular improvements in value, the largest being that of a further 4 points in Newcastle 3½ p.ct. debenture to 75 at the local Exchange, while Wandsworth consolidated gained 3 points to 122½. The quotation of the Tottenham ordinary stock widened to a 10 point margin, which is rather unusual for this class of stock, resulting in a net gain of 1½ points at 110, though business was recorded at 115. There were other improvements of from 1 to 2 points, including all the stocks of the Bristol Company at the local Exchange.

In common with other departments, the Gas Market was not without its reverses, and Imperial Continental recorded a sharp set-back of 12½ points to 155, which was also partly due to an increase from 5 to 10 points in the margin. Both the Gas Light and Newcastle units dropped 3d., while European declined 5 points to 90.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *June* 6.

There is little change in the values of tar products, current prices being:

Pitch, 95s. per ton f.o.b.

Creosote varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 6d. per gallon; pure benzole, 1s. 8d. per gallon; 95/160 solvent naphtha, 1s. 4½d. to 1s. 5d. per gallon; and pyridine bases, 8s. 9d. to 4s. per gallon—all naked at makers' works.

Tar and Tar Products in the Provinces.

June 6.

The average prices of gas-works products during the week were: Gas-works tar, 34s. 6d. to 39s. 6d. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 10d. to 1s. 10½d. Coal-tar crude naphtha, in bulk, North, 5d. to 5½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 3d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 2½d. to 3d.; low gravity, 1¼d.; Scotland, 2½d. to 3d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 8d. to 1s. 9d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *June* 4.

Market conditions show little or no change during the week. Creosote oil and refined tar continue to be in good demand; but other products are comparatively quiet.

Crude gas-works tar.—Actual value remains at 55s. to 60s. per ton *ex* works.

Pitch.—There is a good home demand at 87s. 6d. to 92s. 6d. per ton *ex* works in bulk. Export value is nominal at 82s. 6d. to 87s. 6d. per ton f.o.b. Glasgow.

Refined tar to Ministry of Transport Specification continues steady at 4½d. to 4¾d. per gallon f.o.r. makers' works in buyers' barrels.

Creosote oil.—A ready outlet is obtainable for prompt supplies, and values are firm. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3¾d. to 4d. per gallon; and neutral oil. 3¾d. to 4d. per gallon; all f.o.r. in bulk.

Cresylic acid.—Little interest is being shown in this product, and quotations are irregular. Pale, 97/99 p.ct., is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99 p.ct., 1s. to 1s. 1d. per gallon; and pale, 99/100 p.ct., 1s. 3d. to 1s. 4d. per gallon—all f.o.r. naked.

Crude naphtha.—Value is steady at 4½d. to 5d. per gallon, according to quality and district, with production on the short side.

Solvent naphtha.—90/160 is offered at round 1s. 2½d. to 1s. 3½d. per gallon, and 90/190 at 11d. to 1s. per gallon; but orders are scarce.

Motor benzole.—Demand is poor, but value is unchanged at 1s. 2d. to 1s. 3d. per gallon f.o.r. in buyers' rail tanks.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,,	1	2	,,	1	3	,, ,, ,,
Pure ,,	1	6	,,	1	7	,, ,, ,,

Contracts Advertised To-Day.

Coal.

The Bakewell Urban District Council invite tenders for the supply of gas coal. [Advert. on p. 588.]

Coke Screens.

The Halifax Corporation invite tenders for the supply and erection of coke screens at their gas-works. [Advert. on p. 588.]

Conveyors.

The Halifax Corporation invite tenders for the supply and erection of conveyors at their gas-works. [Advert. on p. 588.]

Gasholder.

The Bakewell Urban District Council invite tenders for the repairs to a 2-lift standard-guided gasholder. [Advert. on p. 588.]

New Capital Issues.

South Shields Gas Company.—The £20,000 of ordinary stock which was recently offered by the South Shields Gas Company was over-subscribed. The average price of stock allotted to applicants was £95 1s. 7d. per £100 of stock.

Lewes Gas Company.—The tenders for this Company's issue of 5 p.ct. perpetual debenture stock were opened on May 31. The issue was largely over-subscribed at prices ranging from £104 per £100 down to the minimum of par. The lowest successful tender was £100 5s., and the average price obtained £101 6s. 9d. p.ct.

Rugby Gas Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Rugby Gas Company, an issue of £25,570 of 5½ p.ct. preference stock at a minimum price of issue of par. Tenders for this issue must be received not later than 11 a.m. on Tuesday, June 14.

Weston-super-Mare Gaslight Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of this Company, £2000 of 5 p.ct. irredeemable debenture stock at a minimum price of issue of £105 per £100 of stock—yielding at that price £4 15s. 3d. p.ct.; and also £14,380 of 5 p.ct. irredeemable preference stock at a minimum price of issue of £97 per £100 of stock—yielding at that price £5 3s. 1d. p.ct. Tenders for these issues must be received not later than 11 a.m. on Thursday, June 23.

Trade Notes.

Stanton Delavaud Spun Iron Pipes.

We have received from the Stanton Ironworks Company, Ltd., near Nottingham, a copy of their very interesting brochure dealing with the Delavaud system of centrifugally casting pipes. Approximately 8000 miles of these pipes have already been sold. Photographs taken on the works show the casting and annealing processes, while full specifications of the various sizes of pipe are included. The self-adjusting Stanton-Wilson pipe joint is also described.

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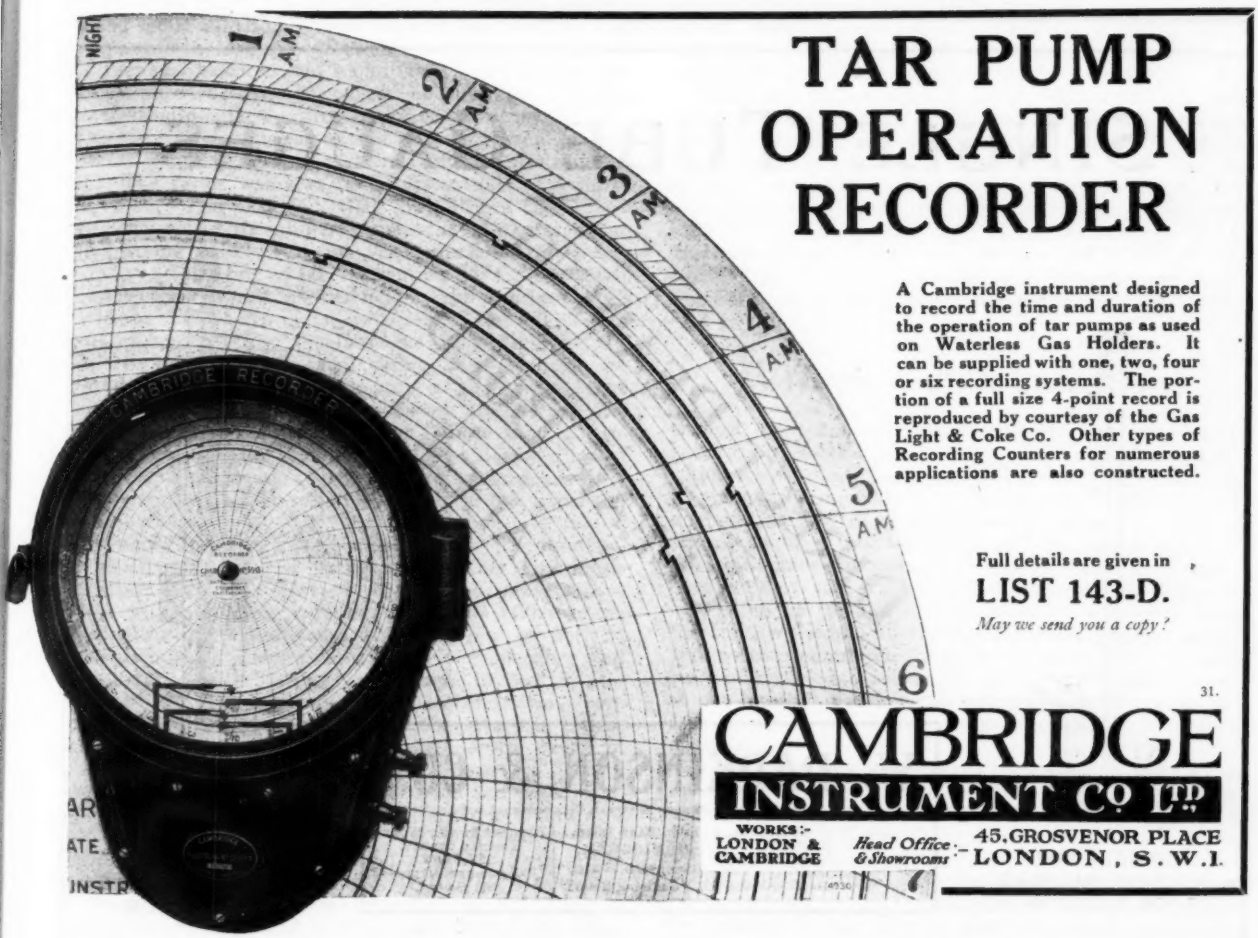

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A Cambridge instrument designed to record the time and duration of the operation of tar pumps as used on Waterless Gas Holders. It can be supplied with one, two, four or six recording systems. The portion of a full size 4-point record is reproduced by courtesy of the Gas Light & Coke Co. Other types of Recording Counters for numerous applications are also constructed.

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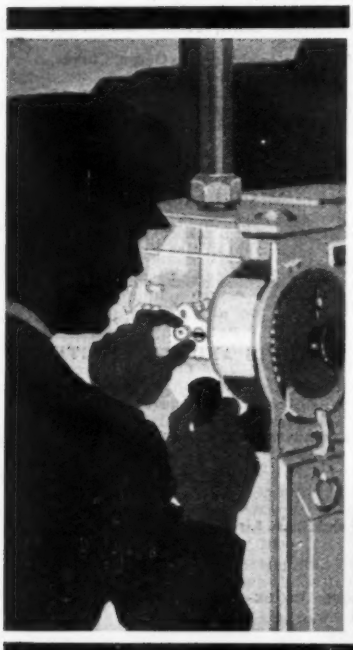

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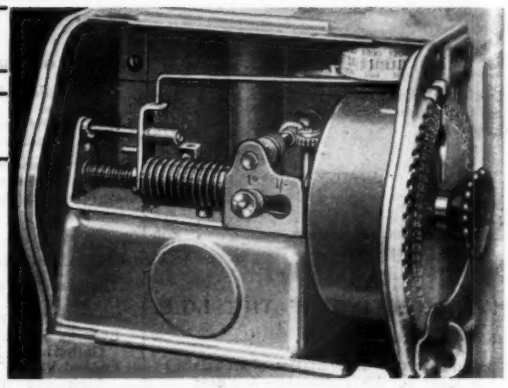

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